GATEWAY CITIES

Strategic Transportation Plan

Freight Focused Traveler Information System – GoFreight

Initial System and Functional Requirements

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Los Angeles County Metropolitan Transportation Authority

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GATEWAY CITIES

Metro

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1 INTRODUCTION

1.1 OBJECTIVES

AGENCY (referred to as AGENCY) seeks to provide reliable traveler information to its freight constituents who live, work, and do business in the Gateway Cities Region as well as potentially in the counties of Los Angeles, Orange, Riverside, Ventura, and San Bernardino. Towards this end, the Contractor shall design, furnish, install, test, and make operational a Freight Focused Traveler Information System called GoFreight for AGENCY. GoFreight shall be designed to be an efficient, effective, reliable, flexible, and expandable system to meet the congestion information needs of the AGENCY, drayage operators, truck drivers, drayage dispatchers, and other members of the freight community. GoFreight will receive and transmit information from the I-710 freeway and the I-710 Zero Emission Freight Corridor (ZEFC) (V2V or V2I) technology system. The other objectives of the GoFreight project are as follows:

- Provide improved delivery of congestion information to the freight travelers
- Provide a single point source for comprehensive drayage traveler information
- Improve drayage operational efficiency
- Reduce congestion on freeways and arterials
- Mitigate drayage impacts on air quality
- Provide information on truck enforcement
- Coordination with other traveler information services

In an era of rapid technology advances and increasing interoperability requirements, the architecture of GoFreight must allow it to be easily maintained, upgraded, expanded, and changed.

The Contractor shall provide supporting documentation, training, and technical support, as specified in these Functional Requirements. The Contractor shall be responsible for all acts, tasks, equipment, system components, and services required to provide AGENCY with a turnkey GoFreight system that is fully functional in accordance with the Requirements and Functional Requirements, (collectively referred to as “Work”), whether or not such Work is specifically identified within this Agreement and the Functional Requirements. Unless otherwise expressly agreed to in writing, all Work under this Agreement shall be performed by the Contractor. The five primary functional areas of GoFreight are as follows:

1. Data Integration Engine
2. Data Dissemination Subsystem
3. GoFreight Webpage
4. GoFreight Interactive Voice Response Subsystem
5. GoFreight Mobile Application

Figure 1 shows a conceptual diagram of GoFreight and Figure 2 shows a data flow diagram for GoFreight.

1.2 CLIENT AND STAKEHOLDERS

A large number of public and private sector stakeholders will be necessary for GoFreight to be successful. Each stakeholder has uniquely defined roles for the project.

1.2.1 Public Stakeholders

1.2.1.1 Federal Highway Administration

The Federal Highway Administration (FHWA) is the agency within the U.S. Department of Transportation in charge of improving mobility on the nation's highways.

Role: The FHWA, with support from their Los Angeles field office, is one of the sponsors of the GoFreight project. The FHWA is involved in the FRATIS Concept project and other related projects such as the Arterial Smart Corridor, and Freeway Smart Corridor projects. The FRATIS Concept project is a related demonstration project sponsored by the FHWA's Office of Freight Management and Operations and U.S. DOT's Research and Innovative Technology Administration (RITA).

1.2.1.2 Los Angeles County Metropolitan Transportation Authority (LA Metro)

LA Metro: Highway Programs – LA Metro is responsible for the continuous improvement of an efficient and effective transportation system for Los Angeles County. The Highway Programs department encompasses a wide range of High Occupancy Vehicle lanes, interchange reconstruction, capacity enhancement, and operational improvement projects throughout Los Angeles County.

Role: The Highway Programs department is one of the partners in the Gateway Cities Technology Plan for Goods Movement project. They provide administrative support services for managing the project. The Highway Programs department will provide input, funding, and oversight on all projects.

1.2.1.3 LA SAFE

LA SAFE: LA SAFE is responsible for the continuous improvement of an efficient and effective transportation system for Los Angeles County. LA SAFE sponsors the 511, #399, RIITS, and the Kenneth Hahn Callbox Systems in Los Angeles County. These programs improve mobility in the region, and provide drivers the tools needed to travel safely throughout the County.

Role: LA SAFE will provide and receive data from the GoFreight project. They may also provide operational support for the project.

1.2.1.4 California Department of Transportation

The California Department of Transportation (Caltrans) is tasked with improving the mobility across California. They are in charge of the 50,000 miles of highway and freeway lanes, as well as inter-city rail services, airports, and heliports within California.

Role: Caltrans will provide and receive data from the project. Caltrans has responsibility for the freeway network in California. Caltrans will also provide input and support for the Arterial and Freeway Smart Corridor projects, the Autonomous Vehicle project, and the Truck Enforcement Network System project.

1.2.1.5 California Highway Patrol

The mission of the California Highway Patrol (CHP) is to provide the highest level of safety, service, and security to the people of California. The CHP patrols and responds to emergencies on the highways.

Role: The CHP will provide and receive data from the GoFreight project. The CHP will also provide review and comments on the Freeway Smart Corridor for Freight and the Truck Enforcement Network System projects.

1.2.1.6 LA County Department of Public Works: Traffic and Lighting Division

The Department of Public Works provides public infrastructure and municipal services for the people in Los Angeles County. The Traffic and Lighting Division's responsibilities encompass traffic design, traffic investigations, traffic impact studies, traffic congestion relief, and street lighting in the unincorporated areas and contract cities within the County of Los Angeles.

Role: The Traffic and Lighting Division will provide and receive data from the GoFreight project. The County will also be involved in the Arterial Smart Corridors for Freight project.

1.2.1.7 City of Los Angeles Department of Transportation

The City of Los Angeles Department of Transportation (LADOT) seeks to provide safe and optimal mobility of people and goods throughout the City of Los Angeles, in support of economic activity and a desirable quality of life. LADOT operates the Automated Traffic Surveillance and Control (ATSAC) System Traffic Management Center.

Role: LADOT will receive data from the GoFreight project that will be used to manage traffic flows on arterials that are controlled by ATSAC, where applicable. They will also provide inputs on the Arterial Smart Corridors for Freight project.

1.2.1.8 POLA/POLB

The Ports of Los Angeles (POLA) and Long Beach (POLB) are located at the southern terminus of I-710, with direct rail connections to downtown Los Angeles and the rest of the nation via the Alameda corridor. The ports are the focal point of drayage truck movement in the Los Angeles area.

The Advanced Transportation Management Information System (ATMIS), a project being developed by the Ports of Los Angeles and Long Beach, involves the installation and operation of cameras, detectors, and message signs, central management software, and data communications to improve management of vehicle movements in and around the Ports.

Role: ATMIS is providing data via RIITS. POLA/POLB may receive data from the GoFreight Project. POLA/POLB will provide input and support to the Arterial Smart Corridor for Freight project and coordination with the freeway element too.

1.2.1.9 Gateway Cities Council of Governments

The Gateway Cities Council of Governments is comprised of representatives from the 28 cities in Southeast Los Angeles County. Through various transportationprojects, they are improving mobility and the quality of life for all residents of Southeast Los Angeles County.

Role: GCCOG is a key sponsor of the GoFreight project. They will be involved in the planning and design of the project, as well as the Arterial Smart Corridors for Freight project. Some cities operate and maintain their own TMC's. It is anticipated there will be coordination of travelers and transportation information with these TMC's and GoFreight.

1.2.2 Private Stakeholders

1.2.2.1 Drayage Operators

Drayage operators transfer goods between the Ports and inland distribution centers. There are a few hundred drayage operators.

Role: Review and comments from drayage operators participating on the ITS Working Group will be used in the planning and design of the GoFreight project, the Arterial and Freeway Smart Corridors for Freight projects. They will receive data from GoFreight and may also provide data to GoFreight.

1.2.2.2 Marine Terminal Operators

Marine Terminal Operators (MTOs) provide the link for goods between ocean carriers and drayage operators.

Role: Marine terminal operators will have the option to share and receive data from the GoFreight project. They will also provide review and comments through participation in the ITS Working Group.

1.2.2.3 Developers/Third Party

Third-party developers will be creating applications and services that provide its customers with accessible and easy to use freight traveler information in the Gateway Cities region.

- Garmin,
- TomTom, and
- INRIX.

Role: Third-party developers will provide input on the planning and design of the GoFreight project. They will also receive data from the GoFreight project.

1.3 EXISTING AND PLANNED SYSTEMS OVERVIEW

1.3.1 Go511

Go511 is a free traveler information system, provided by LA SAFE, that disseminates live traffic reports, transit planning, and commuter service information in the Los Angeles area via a website and toll free IVR. Both services allow users to check real-time traffic speeds and traffic alerts, view live traffic camera feeds, plan a trip on a bus or train, and find a carpool or vanpool partner.

The website, Go511.com, has simple menus allowing users to find information quickly and plan the best route for their needs. An interactive traffic map currently shows real-time traffic speeds, travel times and traffic incidents for freeways. Other features of the website include, real-time images from traffic cameras, buses and train schedules, a trip planner for bus and rail trips, information on carpools and vanpools—including assistance on finding one suitable for the user—and general information on other forms of transportation such as bikes, airports and taxis.

The toll free phone number 511 is accessible from anywhere in Los Angeles county, Orange county, or Ventura county by cellular and landline phones. Users calling this number are connected to an Interactive Voice Response (IVR) system, which allows them to select the services they are interested in. The IVR can accommodate 300 simultaneous sessions with an additional capacity for 500 more sessions using touch-tone only responses. If a user is experiencing a difficulty using the system, the user is automatically routed to a local call center. The dispatcher will assist the user to work through their difficulty and place them back into the IVR system.

Go511 is working on several improvements to the system and adding functionality. My511 is a planned service that would allow users to personalize the data being provided by Go511. This would allow users to receive travel information and alerts for custom routes that have been setup by the users. Other planned improvements include providing AMBER Alerts and general emergency information.

1.3.2 RIITS

The Regional Integration of Intelligent Transportation Systems (RIITS) is a regional network that supports a transportation information exchange between agencies in Los Angeles County. RIITS utilizes a three-pronged approach to accomplish its goal of regional integration. First,

RIITS uses an institutional process for managing the development of a regional network. Secondly, it utilizes a regional communications network, developed and implemented to support inter-agency data exchange. Finally, it employs software tools that allow agencies and private companies to connect and integrate to the network.

RIITS provides two types of data, which are defined by the frequency with which they are updated. Inventory data includes data on field devices such as Device ID, Device Name, and Device Location. Real-time data includes information such as Speed, Volume, Occupancy, Events, and Status of the Device.

1.3.3 Third-Party Traffic Vendor Data (Freeway and Arterial)

Due to the scattered nature of regional arterial traffic data from public agency sources, a third party vendor will be required in order to efficiently and accurately provide comprehensive traffic information. There are many such sources to choose from, such as NAVTEQ (Nokia) and INRIX and the selected provider is to be determined.

The third party vendors for arterial data will also have freeway data as well. Thus, the freeway data from the vendor could be used as a backup source for freeway traffic data in the event the data is unavailable from the primary source.

1.3.4 FRATIS

The Freight Advanced Traveler Information System (FRATIS) is a project sponsored by the FHWA to develop freight specific technology applications to improve freight operational efficiency. The functional requirements for the FRATIS project are leveraging developments in the private sector to develop a series of future phased deployment packages. These packages are leading the deployment of freight Dynamic Mobility Applications (DMAs), encompassing freight real-time traveler information, truck dynamic routing, automated oversize/overweight (OS/OW) planning, and real-time load matching for freight pickups and deliveries. The ongoing FRATIS study focuses on three identified freight application bundles—a Freight Dynamic Route Guidance piece, Freight Advanced Traveler Information with Performance Measures, and Drayage Optimization. The DMAs are intended to leverage emerging industry technologies and applications to provide rerouting information in real time.

1.3.5 ATMIS

The Advanced Transportation, Management, Information, and Security (ATMIS) project collects and processes data from field devices and external systems in the Port of LA (POLA) and the Port of Long Beach (POLB), and disseminates traveler information to inform the users of current roadway and traffic conditions via changeable message signs (CMS), a web-based user interface, and alerts by e-mail and text messages. ATMIS field devices consist of CCTV cameras, vehicle detectors, travel time management systems (TTMS), and CMS. Users will be able to view live video feeds from roadside cameras and obtain information about current conditions and incidents on a map-based web page. ATMIS is expected to provide truck-specific information, such as the number and average speed of trucks traveling between entry points to the area.

ATMIS currently has no staff dedicated to operating the traffic management components of the system. The port security department is the only user of the CCTV images.

1.3.6 Ports of Los Angeles and Long Beach

Information for various locations within the Ports of Los Angeles and Long Beach can also be currently obtained from the Marine Terminal Operators (MTOs) within the ports. This information primarily consists of still video images from CCTV cameras. In general, the camera data is updated on two to four minute intervals. However, in some cases, older data is displayed. The following MTOs currently provide information via the links below.

1.3.6.1 Eagle Marine Services

Eagle Marine Services manages the APL Terminal/Global Gateway South at the Port of Los Angeles. They can be found on the internet at: http://www.eaglemarineservices.com/.

1.3.6.2 APM Terminals

APM Terminals manages the APM Terminal Pier 400 at the Port of Los Angeles. They can be found on the internet at: http://www.apmterminals.com/americas/losangeles/.

1.3.6.3 Evergreen

Evergreeen manages the Evergreen Container Terminal at the Port of Los Angeles. They can be found on the internet at: http://www.egala.com/.

1.3.6.4 Yusen Terminal Inc.

Yusen Terminal Inc. manages the Yusen Terminal at the Port of Los Angeles. They can be found on the internet at: http://www.yti.com/.

1.3.6.5 TraPac Inc.

TraPac Inc. manages the TraPac Inc. Container Terminal at the Port of Los Angeles. They can be found on the internet at: http://www.trapac.com/.

1.3.6.6 West Basin Container Terminal

West Basin Container Terminal manages the West Basin Container Terminal at the Port of Los Angeles. They can be found on the internet at: http://www.wbctla.com/.

1.3.6.7 Long Beach Container Terminal

Long Beach Container Terminal manages Pier F at the Port of Long Beach. They can be found on the internet at: http://www.lbct.com/.

1.3.6.8 Pacific Container Terminal.

Pacific Container Terminal manages the Pacific Container Terminal at the Port of Long Beach. They can be found on the internet at: https://pct.tideworks.com/forecast.

1.3.6.9 International Transport Services Inc.

International Transport Services manages Pier G at the Port of Long Beach. They can be found on the internet at: http://www.itslb.com/.

1.3.6.10 Total Terminals International LLC

Total Terminals International LLC manages Pier T at the Port of Long Beach. They can be found on the internet at: http://www.ttilgb.com/.

1.3.6.11 SSA Marine

SSA Marine manages Terminal C60 at the Port of Long Beach. They can be found on the internet at: http://www.ssamarine.com/locations/pacificSW/terminal_c60.asp.

1.3.6.12 California United Terminals

California United Terminals manages the CUT Terminal at the Port of Los Angeles. They can be found on the internet at: http://www.shipcut.com/.

1.3.6.13 Tideworks

Tideworks Technology provides Information Technology support for Pier A and Pier J at the Port of Long Beach. Information for these two locations can be found on the internet at: https://piera.tideworks.com/forecast and https://pct.tideworks.com/forecast.

1.3.7 CHP

The California Highway Patrol (CHP) seeks to provide the highest level of safety, service, and security to the people of California. This is accomplished through five departmental goals, one of which is to Manage Traffic and Emergency Incidents. Towards this end, CHP provides a list of the current traffic incidents which is updated every minute as well as a link to Road Information that is supplied by the California Department of Transportation.

1.3.8 Caltrans Construction

The Caltrans Division of Construction is tasked with the administration and management of construction contracts for the California Department of Transportation. One of the tasks is providing inputs to the Caltrans Lane Closure System (LCS). The LCS maintains a list of all current and future planned road work that will necessitate the closure of lanes on highways. The information provided includes where the closure will be located, how many lanes will be affected, and when the closure will be in effect.

1.3.9 TENS

A Truck Enforcement Network System (TENS) is being developed to help manage the inspection and enforcement of a large numbers of trucks using technology along freeways and some arterial highways that service the ports. This system is to be constructed with permanent truck inspection facilities. This would consist of automating the potential permanent truck inspection facilities combined with virtual sites. The virtual sites will be a series of technologies placed on the freeways and arterials that could automatically monitor the speed, volume, density, flow rate, license plates, USDOT #, inspection decals, transponders and weights of the trucks.

1.3.10 Weather

There are many sources for weather information of varying quality that is readily available. Go511 uses the Weather Channel as the feed for current weather conditions. The Go511 Traveler Information Center (TIC) also provides alerts for weather conditions that have the potential to affect traffic conditions.

Figure 1 GoFreight Conceptual Diagram

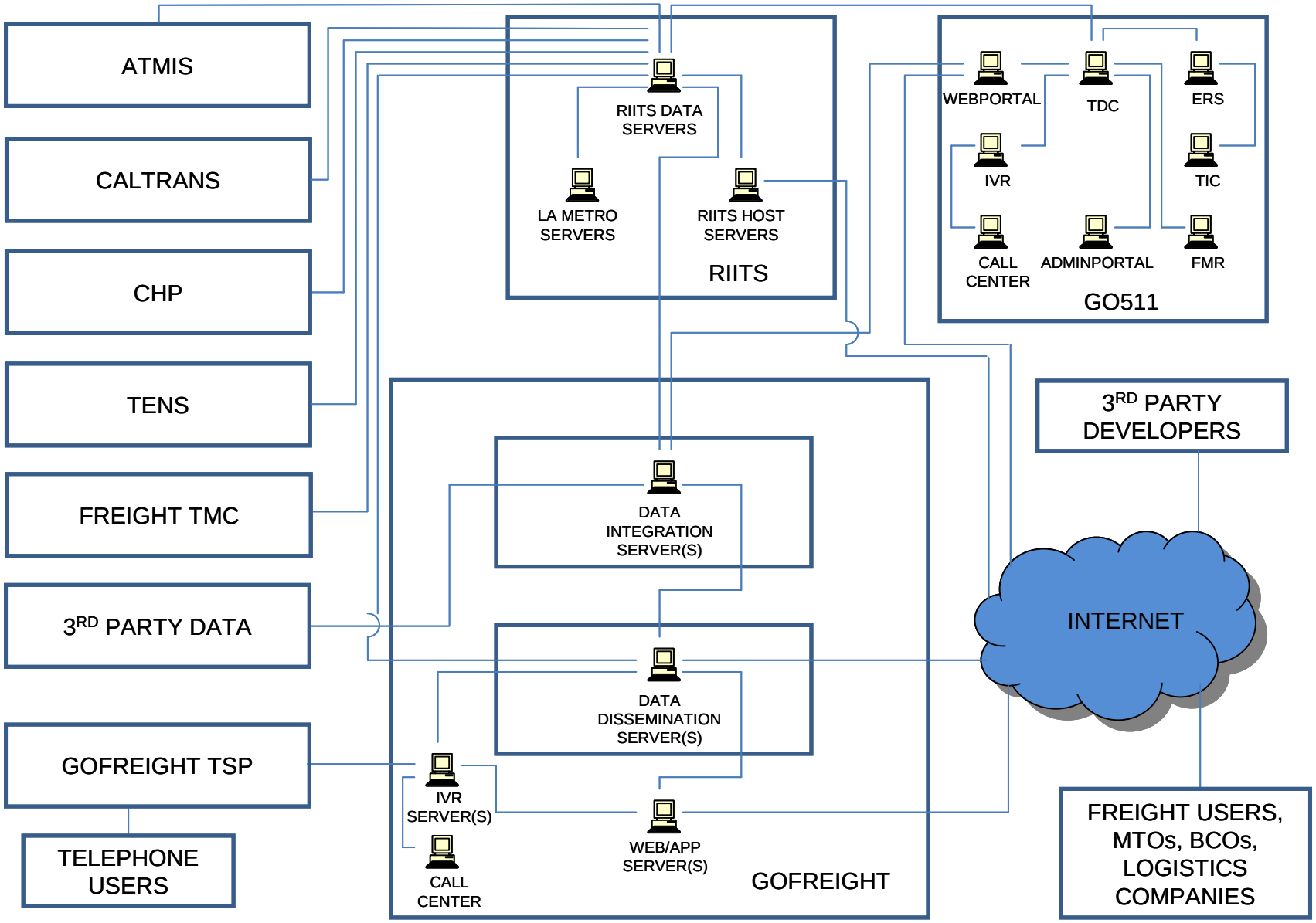
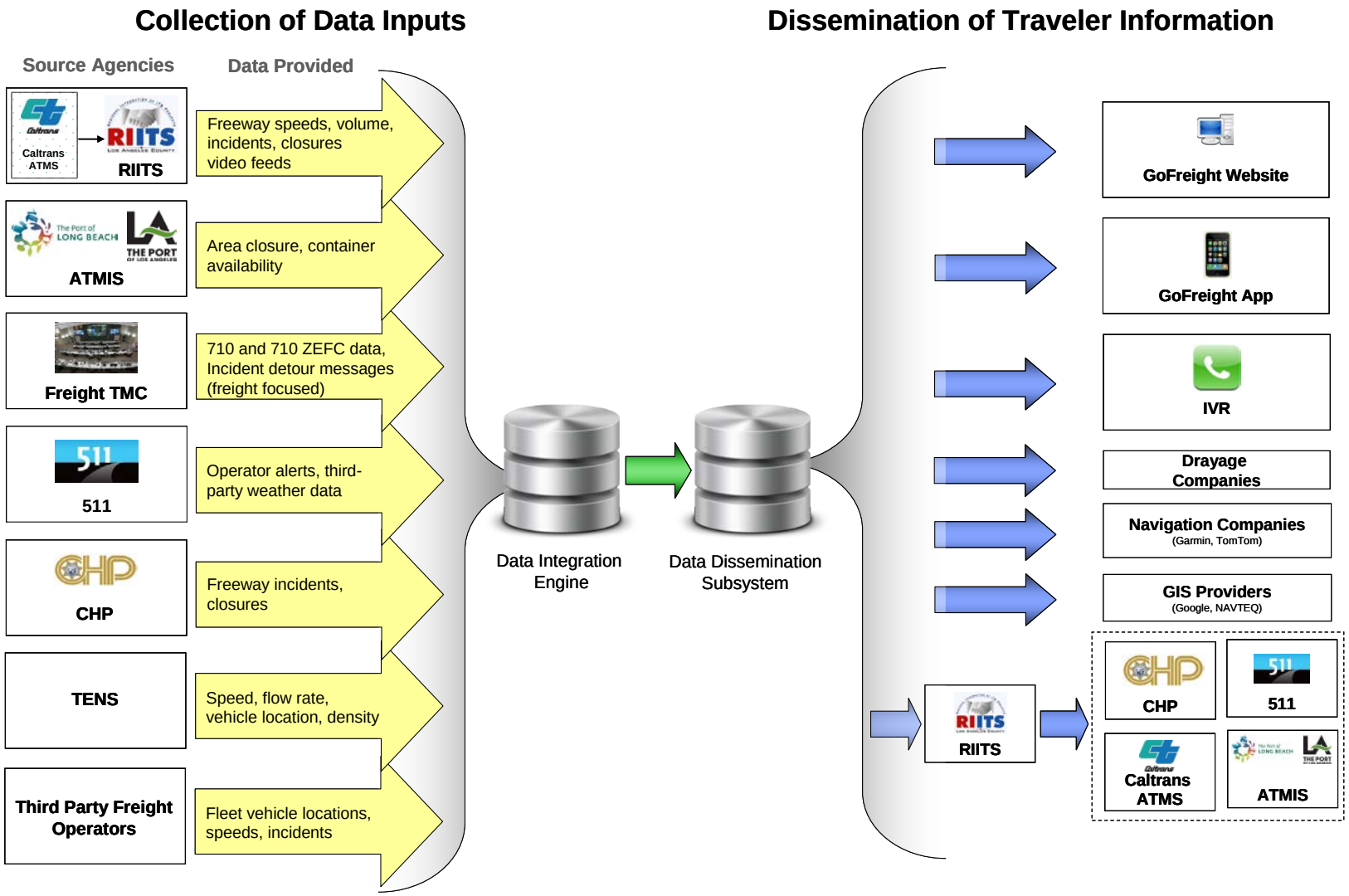


Figure 2 GoFreight Data Diagram



2 FUNCTIONAL REQUIREMENTS

2.1 GOFREIGHT.COM WEBSITE

2.1.1 Overview

The GoFreight website shall provide freight-related traveler information for the Gateway Cities region to users within the freight community. Website users shall be able to obtain information about freeway and arterial traffic speed and travel time, incidents, alerts, and terminal queue times at the ports of LA and Long Beach. Registered users shall be able to configure and save personalized routes and port terminals as "Favorites." The website shall provide them real-time speed, travel time, incidents, and port terminal queue time information for their personalized routes and other transportation information. Registered users shall be able to configure personalized alerts for their Favorites. The personalized alerts shall be sent to users via pop-up messages, emails, and mobile phone text messages.

The website shall be a fully responsive site that can adapt itself to different browser widths on different devices.

2.1.2 Website Functions--Anonymous Users

The GoFreight website shall allow unregistered users to browse the site to obtain freight traveler information.

2.1.2.1 Traffic map

The GoFreight website shall enable users to view the traffic maps for Los Angeles County and portions of the surrounding counties. At a minimum, the traffic maps shall encompass the same area that Go511 covers. The traffic maps shall display traffic data including real-time freeway and arterial speeds, travel times, incidents, alerts, and traffic camera videos and/or still images.

Users shall be able to zoom in, zoom out, scroll and pan the traffic maps. The highest-level map display shall include all of the area covered by GoFreight and designated portions of adjoining areas up to ten miles beyond the GoFreight area. The lowest level map shall show all highways, streets, roads, railroad tracks, water boundaries, jurisdictional boundaries, and significant landmarks within the displayed area.

The traffic maps shall use a color scheme to denote traffic speeds that is consistent with the traffic speeds provided on Go511.com.

2.1.2.2 Traffic by type

The GoFreight website shall enable users to selectively view traffic by type. The traffic types are freeway and arterials that allow freight traffic. In addition, the website shall enable users to select to view a subset or subsets of data types, including speeds, travel times, incidents, alerts and traffic camera videos and/or still images.

2.1.2.3 Traffic by area

GoFreight shall enable users to selectively view traffic by area.

2.1.2.4 Traffic speed and travel time

GoFreight shall enable users to view traffic speed and travel times for key freeway and arterial routes within the five counties.

Traffic speeds for segments of key arterials and highways shall be displayed on a map with color codes: green, yellow, and red.

2.1.2.5 Traffic Cameras

The GoFreight website shall enable users to view still images or traffic video from cameras showing freeway and arterial traffic. Users shall be able to view images by clicking on a camera icon displayed on a map or on a list of cameras. All images displayed shall include a time stamp.

2.1.2.6 Port Terminal Gate Information

The GoFreight website shall provide current terminal gate information of the Ports of Los Angeles and Long Beach.

2.1.2.7 Port Terminal Gate Cameras

The GoFreight website shall enable users to view videos or still images from gate queue cameras at the terminals of the Ports of Los Angeles and Long Beach. All images displayed shall include a time stamp.

2.1.2.8 Dynamic alerts

The GoFreight website shall provide real-time access to dynamic alert messages. The alerts shall be displayed on a prominent location on all pages of the website.

2.1.2.9 Account registration

The GoFreight website shall provide users with the ability to register for account access. The registration shall consist of the following steps:

Registration: The website shall require users to enter their first name, last name, and email address. The website shall check to see if the email address has already been registered. If so, GoFreight shall inform the user that email address is already registered and suggest the user to visit the password recovery page.

Email verification: To verify the newly registered email address belongs to the user, GoFreight shall send an email to the email address. The email body shall contain a hyperlink embedded with an MD5 hash code. GoFreight shall instruct the user to click on the link. This will complete the email verification.

Password entry: Once the user's email address has been verified, GoFreight shall request the user to establish a password for the account. GoFreight shall then enable the user to enter a password that meets certain requirements such as minimum password length and character types and then request the user to confirm the password. The user's information shall be stored in the GoFreight user database.

2.1.2.10 Account login and password recovery

The GoFreight website shall provide users with the ability to login to their accounts. The website shall provide a password recovery process to users who forget their password with via a password recovery page and process. GoFreight shall request the user's email address and then send a unique MD5 hash code embedded in a hyperlink to the user's email address. The user shall be able to click on the link in the email and be redirected to a page where the user can reset the password for the user's account.

2.1.2.11 Account profile

When a user completes registration, the GoFreight website shall ask user to enter account profile information. The information shall include:

- Telephone number, including mobile phone number
- Type of GoFreight user
  - Truck driver
  - Dispatcher
  - TBD

2.1.2.12 Access useful links page

The GoFreight website shall contain a Useful Link page that allows easy access to the following links:

- Port of Long Beach (http://www.polb.com/default.asp)
- Port of Los Angeles (http://www.portoflosangeles.org/)
- PierPass (http://pierpass.org/offpeak-login/)
- Local Truck Routes and Parking (http://www.dot.ca.gov/hq/traffops/trucks/truckmap/local-truck-routes.htm)
- Truck Route Map (http://www.dot.ca.gov/hq/traffops/trucks/truckmap/)

- Special Truck Restrictions on State Highways (http://www.dot.ca.gov/hq/traffops/trucks/routes/restrict-list.htm)
- Truck Stops (http://www.dot.ca.gov/hq/traffops/trucks/routes/truck-stops.htm)
- Statewide Rest Areas (http://www.dot.ca.gov/hq/maint/ra/Statewide.htm)
- OS/OW Permits (http://www.dot.ca.gov/hq/traffops/permits/)
- California Trucking Association (http://caltrux.org/)

2.1.3 Website Information/Features Provided -- Logged-In Users

For users who have logged into their accounts, GoFreight shall provide all functions that are available to anonymous visitors, plus the following:

2.1.3.1 Create and Save Favorites Functionality

The GoFreight website shall enable registered users to define and save routes that include segments of arterials, freeways, and near-ports roadways in "Favorites." Users shall be able to define a route by entering a start and end address. Users shall be able to specify a terminal gate as an endpoint, starting point, or an intermediate point. The website shall automatically create the route and display it on a map and request the user to confirm the route. The routes shall only use roadways that are approved for freight users. The GoFreight website shall provide a user friendly means for the user to modify the route. The GoFreight website shall retain the route in the user's account and store the data in the GoFreight User Database. Users shall also be able to save destinations and terminal gates at the Port of Long Beach and Port of Los Angeles in "Favorites."

A registered user shall be able to create and save TBD number of favorites.

2.1.3.2 Route Speed, Travel Time, Alerts and Incidents

The GoFreight website shall provide real-time traffic information, including speed, estimated travel times, incidents, and alerts for routes listed in "Favorites".

2.1.3.3 Incident Alerts

The GoFreight website shall enable users to receive alerts of incidents for routes listed in "Favorites."

2.1.3.4 Port Terminals

The GoFreight website shall display terminal gate information, alert information, and video images for the user's Favorite terminals. If the terminal has a scheduling website, the GoFreight website shall display the URL for the scheduling website.

2.1.4 Website Information/Features Provided--Logged-In Dispatchers

For logged-on drayage dispatchers, the GoFreight website shall provide all functions available to anonymous visitors and logged-in users, plus the following:

2.1.4.1 Driver Account Following

The GoFreight website shall provide a means for users to register their consent to be followed by another user, such as the company's dispatcher. The following user can also send a request to follow a user. The following user shall be notified of the followed user's consent. A user shall be able to follow multiple users, and a user shall be able to give consent to be followed by multiple users. The GoFreight website shall enable a user to rescind consent to be followed and enable a following user to stop following a particular user.

Once consent to be followed has been granted to and accepted by the following user, the following user shall be able to view the information provided in the followed user's Favorites. The following user shall also be given the followed user's location if the followed user is logged in via the GoFreight App and the GoFreight App is able to determine the user's location. The following user shall also be given the followed user's time of arrival information if the GoFreight App is providing this information to the followed user.

2.1.4.2 Export functionality

The GoFreight website shall allow users to export selected data, including the following:

- Travel times and terminal gate information for the Favorites of the users they are following
- Estimated arrival time of the users they are following
- Locations of the users they are following

2.1.4.3 Mobile Website Requirements

The GoFreight website shall allow users using web browsers on mobile devices to access the GoFreight website, including tablet computers and smartphones. The users of the mobile devices shall have access to the same set of information, features, and functionalities as provided users of desktop and laptop computer.

The same URL shall be used by all users, regardless of their web browser or device. No separate subdomains shall be used for mobile users.

GoFreight website shall be designed to be adaptive to the width of the device screen. The responsive design shall use the following breakpoints:

- 1200px (wide screen)
- 1024px for 10" tablets (landscape)
- 768px for 10" tablets (portrait)
- 600px (7" tablets)
- 480px (smartphone)

2.2 SMARTPHONE MOBILE APPLICATION REQUIREMENTS

The GoFreight App shall be developed for both the iOS and Android operating systems. The GoFreight App shall allow users to view traffic information on a map and in tabular form, incidents, alerts and gate queue times. The GoFreight App's user interfaces (in both iOS and Andriod versions) shall utilize the entire screens of the mobile devices they are installed on. No blank areas shall be present.

The GoFreight App shall ask the user to login to obtain customized information. The registration procedure shall mirror and be consistent with the account registration procedures for the GoFreight website. The GoFreight App shall utilize the same account information as the GoFreight website. Once the user has logged in, they can do the following:

- Create and save favorite routes, destinations, and terminals
- View traffic information, alerts and travel times for favorite routes
- View gate information for favorite terminals
- Receive alerts for favorite routes
- Consent or decline a request to be followed by another user
- Send request to follow another user
- Manage the account settings

The GoFreight App shall accept and execute verbal commands from users.

2.2.1 Location Tracking

The GoFreight App shall request the user's consent to access the mobile device's location information. Once the consent is obtained, the GoFreight App shall track the user's location for all subsequent sessions until the user rescinds the consent. GoFreight shall store the user's location data in a GoFreight database as an anonymous traveler. GoFreight shall also provide the user's location to the user's followers.

Once consent has been granted by the user provide the mobile device's location, the GoFreight App shall allow users to do the following:

- Receive audio turn by turn instructions while traveling on a favorite route or to a favorite destination
- Receive dynamic routing turn by turn instructions
- Receive time of arrival information while traveling on a favorite route or to a favorite destination
- View traffic conditions in the vicinity of the user

2.2.2 Audio Announcements of GoFreight Information

The GoFreight App shall be capable of providing audio information via the mobile device's speakers. The GoFreight App shall allow the user to enable audio notifications. Once audio notifications are enabled, the GoFreight App shall provide the following information via audio outputs:

- Travel times and alerts for the user's favorite routes
- Terminal information for the user's favorite terminals
- Travel time and time of arrival information when the user has selected a favorite destination
- Turn by turn directions when the user is traveling on a selected favorite route, traveling to a selected destination, or using dynamic routing

2.2.3 Dynamic Routing

The GoFreight App shall provide dynamic routing to users who have consented to providing location information to GoFreight and are traveling to a selected destination. The GoFreight App shall determine the best route based upon the current traffic conditions obtained from all available sources and the route criteria as specified by the user. The GoFreight App shall allow the user to specify that the selected route be one of the following:

- fastest route or lowest travel time
- shortest route or least miles traveled
- shortest route utilizing major freeways.

If the user deviates from the selected route, the GoFreight App shall automatically recalculate a new route based upon current traffic conditions and the route criteria.

The GoFreight App shall provide both audible and graphical turn by turn directions for the route. The audible directions shall announce the distance to the next turn, the direction of the next turn, and the name of the street to be turned onto or the destination (if that is the next point on the route). The audible announcements shall be made just after the previous turn and again just before the current turn. The graphical directions shall mirror the audible directions with the addition of displaying a distance countdown to the next turn as well as a map showing the user's location, the upcoming street name, and the next turn instruction.

If a condition such as excessive traffic or an alert occurs on the route that will result in a significant delay, the GoFreight App shall make an audible and graphical announcement of the condition and offer to calculate a new route. The GoFreight App shall recalculate the route if the user verbally accepts the offer or selects a "yes" button on the GoFreight App screen.

2.3 IVR REQUIREMENTS

The GoFreight IVR shall receive telephone calls from GoFreight users and provide them with traffic information that mirrors the information provided to users of the GoFreight website. The traffic data reported by the IVR shall be identical to the data reported on the GoFreight website.

The GoFreight IVR shall provide traffic information for freeways and major arterials for an area that at a minimum shall encompass the same area that Go511 covers and mirrors the area covered by the GoFreight website. The traffic information provided shall include real-time freeway and arterial speeds, travel times, and incidents. The travel times on freeways shall be

provided between freeway interchanges such as “average speed of traffic on the 405 south between the 10 and the 90. The travel times on arterials shall be provided between major intersections such as “average speed of Sepulveda Blvd between Wilshire Blvd and Santa Monica Blvd.” Traffic information shall be provided for hot spots. The GoFreight IVR shall provide a list of hotspots.

2.3.1 Voice Commands

The GoFreight IVR shall respond to voice commands. When the GoFreight IVR receives a telephone call from user, it shall greet the user with a short introductory message with brief instructions on using the IVR system. The GoFreight IVR shall first ask the user to state the freeway or arterial for which traffic information is requested. Next, the GoFreight IVR shall ask the user to state the direction of travel and the exit (for freeways) or intersection (for arterials) for which traffic information is requested. The GoFreight IVR shall provide clear and concise information. The GoFreight IVR shall play general system-level service announcements at the beginning of the session.

The GoFreight IVR shall repeat a prompt if a response is not received after ten seconds or is not recognized. The GoFreight IVR shall offer more detailed instructions on using the subsystem if the caller fails to responds within ten seconds of a repeated prompt.

The GoFreight IVR shall transfer the user to a live attendant when the IVR fails to understand the user’s response after a system defined number of attempts.

The GoFreight IVR shall respond as follows when the user says:

- Repeat – repeat information
- Next – halt the current announcement and jump to the next announcement
- Stop – stop announcing information
- Main Menu – return to the main menu
- Goodbye – terminate the call.

The GoFreight IVR shall enable users to create a personalized pin for their account, allowing users to log onto their GoFreight account by supplying their pin. Once logged on, the users can listen to traffic information for their favorites.

3 DATA INPUTS AND INTEGRATION

GoFreight shall request and receive traffic and freight traffic data from external sources and retain the data in the GoFreight TIS database. The types of data and their current formats are summarized in this section. The Contractor shall develop a data input and integration process and algorithm for these data inputs. The Contractor shall be responsible for obtaining any updated information regarding the data inputs.

3.1 SOURCES FOR DATA INPUTS

GoFreight shall request and receive traveler information from external sources, including RIITS, 511, private traffic data providers, and the ATMIS system at the Ports of LA and Long Beach. The following table summarizes the types of available data and their sources.

Date Source	Freeway Data	Arterial Data	Ports Data
RIITS	Speed Travel Time Incidents Changeable Message Signs Camera Images	Speed Travel Time Incidents (Only within City of LA)	-
Go511.COM	Speed Travel Time Incidents	-	-
Private Sources	Speed Travel Time Incidents	Speed Travel Time Incidents	-
ATMIS	-	-	Video / Camera Image Speed Travel Time Events
I-710 ZEFC	Speed Travel Time Incidents		
TENS	Speed Flow Rate, Density Vehicle Location	Speed Flow Rate, Density Vehicle Location	

3.2 TRAFFIC DATA FORMATS

3.2.1 Traffic Data from RIITS

3.2.1.1 Traffic Congestion Inventory Data

Data Field	Definition	Example
agencyName	Name of the agency	Caltrans D-7
Time Stamp		
Date	Date	20040826
Time	Hour, minute and second	16071800
Update Time	Time that the data was last updated	
Date	Date	20040826
Time	Hour, minute and second	16071800
Link ID	ID of the link	715929
Location		
onStreetInfo		
Name	Name of the street the link is on	I-5
fromStreetInfo		
Name	Name of the cross street where the link starts	Mission
toStreetInfo		
Name	Name of the street where link ends	Atlantic
startGeoLocation		
Latitude	Latitude of the cross street at the beginning of the link (decimal not included)	33879966
Longitude	Longitude of the cross street at the beginning of the link (decimal not included)	-118021304
Direction	Direction (Boolean)	0 or 1
adminArea (City)		
City	Name of the City	Los Angeles
postmile	Postmile	9.5
affectedLanes		
laneCnt	Lane number	4
Type	Type of lane	Highway

3.2.1.2 Traffic Congestion Data

Data Field	Definition	Example
Agency	Name of the agency	Caltrans D-7
Time Stamp		
Date	Date	20040826
Time	Hour, minute and second	16071800
Update Time		

Date	Date	20040826
Time	Hour, minute and second	16071800
Link ID	ID of the link	33879966
Speed	Speed measured, in kilometers per hour (kph)	80.00 (kph)
Volume	Volume (unit TBD)	8
HOV Speed	Speed in the HOV lan	80
linkDataStatus	Status of link data	OK; Failed

3.2.1.3 Travel Time Inventory Data

Data Field	Definition	Example
AgencyName	Name of Agency	Caltrans D-7
MessageID	ID of the message	1241035321987
Timestamp	Timestamp	
Date	Date	20040826
Time	Hour, minute and second	16071800
Updatetime	Time last updated	
Date	Date	20040826
Time	Hour, minute and second	16071800
TravelLink		
Link ID	ID of the link	715898
Route	Name of the route	I-5 Freeway
Direction	Direction	South
Link Type	Freeway	Freeway
beginNode ID	ID of the beginning node	715898
EndNodeID	ID of the end node	762398
Length	Length of the link, , in miles	2.8
Location		
Begin Cross Street	Name of the cross street at the beginning of the link	PHOEBE
BeginLatitude	Latitude of the cross street at the beginning of the link (decimal not included)	33879966
BeginLongitude	Longitude of the cross street at the beginning of the link (decimal not included)	-118021304
End Cross Street	Name of the cross street at the end of the link	OSMOND
EndLatitude	Latitude of the cross street at the end of the link (decimal not included)	33875955
EndLongitude	Longitude of the cross street at the end of the link (decimal not included)	-118013957

3.2.1.4 Travel Time Data

Data Field	Definition	Example
Agency	Name of the agency	Caltrans D-7
Time Stamp		
Date	Date	20040826
Time	Hour, minute and second	16071800
Update Time	Time that the data was last updated	
Date	Date	20040826
Time	Hour, minute and second	16071800
Link ID	ID of the link	
Speed	Speed measured, in miles per hour (mph)	65.00 (mph)
Travel Time	Travel time calculated, in minutes	45 (minutes)

3.2.1.5 CCTV Inventory Data

Data Field	Definition	Example
Agency	Name of the agency	Caltrans D-7
Time Stamp		
Date	Date	20040826
Time	Hour, minute and second	16071800
Update Time	Time that the data was last updated	
Date	Date	20040826
Time	Hour, minute and second	16071800
ID	ID of the CCTV	15
Location		
onStreetInfo		
Name	Name of the street the CCTV is on	I-5
fromStreetInfo		
Name	Name of the cross street where link starts	Mission
toStreetInfo		
Name	Name of the street where link ends	Atlantic
startGeoLocation		
Latitude	Latitude (decimal not included)	33846681
Longitude	Longitude (decimal not included)	-118205509
Direction	Direction (Boolean)	0 or 1
adminArea		
City	Name of the city	Los Angeles
postmile	Postmile	9.5
CCTV-URL	URL of the camera image	cd7_15.jpeg
Video ID	ID of the CCTV	15
Streaming Status	isStreaming = true / false	True

3.2.1.6 CMS (Changeable Message Sign) Inventory Data

Data Field	Definition	Example
Agency		Caltrans D-7
Time Stamp		
Date	Date	20040826
Time	Hour, minute and second	16071800
Update Time	Time that the data was last updated	
Date	Date	20040826
Time	Hour, minute and second	16071800
ID	ID number of the CMS	
Location		
onStreetInfo		
Name	Name of the street the CCTV is on	I-5
fromStreetInfo		
Name	Name of the cross street where link starts	Mission
toStreetInfo		
Name	Name of the street where link ends	Atlantic
startGeoLocation		
Latitude	Latitude (decimal not included)	33846681
Longitude	Longitude (decimal not included)	-118205509
Direction	Direction (Boolean)	0 or 1
adminArea		
City	Name of the city	Los Angeles
postmile	Postmile	9.5

3.2.1.7 CMS (Changeable Message Sign) Response Data

Data Field	Definition	Example
Agency	Name of the agency	Caltrans D-7
MessageID	ID of the message	1241035321987
Time Stamp		
Date	Date	20040826
Time	Hour, minute and second	16071800
Update Time	Time that the data was last updated	
Date	Date	20040826
Time	Hour, minute and second	16071800
ID	ID of the device	96
dms-device-status	Status of the device	OK
dmsState	State of the DMS	Sign Display
dmsCurrentMessage		
dmsMessageTimestamp		
Date	Date	20040826

Time	Hour, minute and second	16071800
phase1Line1	Message displayed in Phase 1, line 1	MINUTES TO
phase1Line2	Message displayed in Phase 1, line 2	RTE 405..... 11
phase1Line3	Message displayed in Phase 1, line 3	RTE 134..... 20
Phase2Line1	Message displayed in Phase 2, line 1	CLICK IT OR TICKET
Phase2Line2	Message displayed in Phase 2, line 2	IT'S THE LAW
Phase2Line3	Message displayed in Phase 2, line 3	

3.2.2 Traffic Data from Go511

3.2.2.1 Mainline Routes

Data Field	Definition	Example
DirectionOfTravel	Direction of Travel. Enumeration of directions	East
ID	Route ID	MATIS::I10E002
LengthMeters	Length of the route, in meters	15000
Name	Name of the route (section)	From I-405 To I-110
RoadwayName	Name of the roadway	I-10
SpeedMetersPerHour	Speed of traffic, in meters per hour	38000
TravelTimeMinutes	Travel Time, in minutes	23

3.2.2.2 HOV Routes

Data Field	Definition	Example
DirectionOfTravel	Direction of Travel. Enumeration of directions	East
ID	Route ID	MATIS::I10E005HV
LengthMeters	Length of the route, in meters	15000
Name	Name of the route (section)	From I-5 To I-710
RoadwayName	Name of the roadway	I-10
SpeedMetersPerHour	Speed of traffic, in meters per hour	38000
TravelTimeMinutes	Travel Time, in minutes	23

3.2.2.3 Mainline Links

Data Field	Definition	Example
DirectionOfTravel	Direction of Travel. Enumeration of directions	South
StartLatitude	Latitude at the start of the link	33.569637
StartLongitude	Longitude at the start of the link	-117.701419
EndLatitude	Latitude at the end of the link	33.567395
EndLongitude	Longitude at the end of the link	-117.698654
ID	Link ID	District 12::1210479
RoadwayName	Name of the roadway	SR-73
SpeedMetersPerHour	Speed of traffic, in meters per hour	112654

3.2.2.4 HOV Links

Data Field	Definition	Example
DirectionOfTravel	Direction of Travel. Enumeration of directions	South
StartLatitude	Latitude at the start of the link	33.569637
StartLongitude	Longitude at the start of the link	-117.701419
EndLatitude	Latitude at the end of the link	33.567395
EndLongitude	Longitude at the end of the link	-117.698654
ID	Link ID	District 12::1210479
RoadwayName	Name of the roadway	SR-73
SpeedMetersPerHour	Speed of traffic, in meters per hour	112654

3.2.2.5 Incidents

Data Field	Definition	Example
CountyName	Name of the county where the incident is	Los Angeles
Description	Description of the incident	Traffic hazard; injury accident; minor accident
DirectionOfTravel	Direction of Travel. Enumeration of directions	South
ID	Incident ID	MATIS::1522446
LanesAffected	Lanes that are affected by the incident	3, 4
LastUpdated	Time of last update	6/25/13 3:34pm
Latitude	Lattitude of the incident location	34.13885
Longitude	Longitude of the incident location	-117.24367
Location	Description of the location	Near Katella Ave
StartDate	Start date of the incident	6/25/2013
PlannedEndDate	Planned end date	6/25/2013
Reported	Time at which the incident was first reported	6/25/13 3:34pm
RoadwayName	Name of the roadway	I-405
Severity	Severity of the incident	Minor, major, unknown

3.2.2.6 Roadwork

Data Field	Definition	Example
CountyName	Name of the county where roadwork is located	Los Angeles
Description	Description of the roadwork	Roadwork
DirectionOfTravel	Direction of Travel. Enumeration of directions	North; South
ID	ID of the roadwork event	MATIS:: 1411252
LanesAffected	Lanes that are affected by the roadwork	1, 2, 3, 4
LastUpdated	Time of last update	7/3/13 5:16am
Latitude	Lattitude of the roadwork location	34.13885
Longitude	Longitude of the roadwork location	-117.24367
Location	Description of the location	Near Katella Ave

StartDate	Start date of the incident	6/25/2013
PlannedEndDate	Planned end date	6/25/2013
Reported	Time at which the incident was first reported	6/25/13 3:34pm
RoadwayName	Name of the roadway	I-405
Severity	Severity	Minor, major, unknown
LcsEntry	Lane control entry	
BeginLocationDescription	Description of the beginning location	Triggs St
Description	Description of the lane control event	Shoulder Reconstruction
DirectionOfTravel	Direction of travel	North
EndLocationDescription	Description of the end location	E Olympic Blvd
LanesAffected	Lanes affected	4, 3
Latitude	Latitude	34.01607
Longitude	Longitude	-118.17315
PlannedStartDate	Planned start date	11:01pm, 7/8/13
PlannedEndDate	Planned end date	5:01am, 7/9/13

3.2.2.7 Road conditions

Data Field	Definition	Example
CountyName	Name of the county the road condition occurs	Los Angeles
Description	Description of the road condition	Landslide
DirectionOfTravel	Direction of Travel. Enumeration of directions	North
ID	Incident ID	MATIS:: 1422950
LanesAffected	Lanes that are affected by the incident	1, 2
LastUpdated	Time of last update	3/21/13 11:02am
Latitude	Lattitude of the incident location	34.03581
Longitude	Longitude of the incident location	-118.53575
Location	Description of the location	Near Temescal Canyon Rd
StartDate	Start date of the incident	6/25/2013
PlannedEndDate	Planned end date	6/25/2013
Reported	Time at which the incident was first reported	3/21/13 6:38am
RoadwayName	Name of the roadway	SR-1
Severity	Severity of the incident	Unknown, minor, major

3.2.2.8 Roadways

Data Field	Definition	Example
RoadwayName	Name of the roadway	I-5
SortOrder	Order in which the roadways are listed	1

3.2.2.9 Message Signs

Data Field	Definition	Example
DirectionOfTravel	Direction of Travel. Enumeration of directions	South
ID	ID of the message sign	District 07::105
Latitude	Latitude of the message sign location	34.27729
Longitude	Longitude of the message sign location	-119.29415
Message	Message displayed	MINUTES TO RTE 23..... 30 TOPANGA CYN. 45
Name	Name of the message sign location?	South of SR-33
Roadway	Name of the roadway	US-101

3.2.2.10 Camera

Data Field	Definition	Example
DirectionOfTravel	Direction of Travel. Enumeration of directions	South
ID	ID of the camera	District 12::26
Latitude	Latitude of the message sign location	33.67669
Longitude	Longitude of the message sign location	-117.843667
Name	Name of the camera location?	At Jamboree Rd
Roadway	Name of the roadway	I-405

3.2.2.11 Camera Image

Each camera image is provided in the form of a jpg image retrieved at a URL in the following format:

http://www.go511.com/CctvImageHandler.ashx?networkID={Network ID}&deviceID={Device ID}

3.2.2.12 Alerts

Data Field	Definition	Example
CountyName	Name(s) of the county	la, oc, rc, sb, vc
ID	ID of the alert	19707
Message	Message of the alert	SigAlert: I-405 Southbound after Seal Beach Blvd
Notes	Notes to the alert	Carpool and left lanes are blocked until further notice

3.2.3 Traffic Data from ATMIS

3.2.3.1 Port Queue Time Inventory Data

Port gate queue inventory data for both Port of Long Beach and Port of LA will be available through the ATMIS. Data fields and formats will be provided by the Agency.

3.2.3.2 Port Queue Time Status Data

Port queue time data are currently unavailable from ATMIS. A source for port queue time data will be obtained prior to the inception of the GoFreight development.

3.2.3.3 Intersection Signal Control Inventory Data

organization-id	ID of owning organization	String.
organization-name	Name of owning organization	String.
device-id	Device Identifier	Unique ID
device-location	Device latitude / longitude location	Integers, in micro degrees
device-name	Device name or description.	String.
last-update-time	Last update time of inventory information	Date-time-zone object.
device-control-type	Control type requested by the external center	String enumeration. Valid values include “status only”, “command only”, “status and command”, and “not specified”.
link-direction	Direction of the link the device is located at	String enumeration. Valid values include: "any other", "n", "ne", "e", "se", "s", "sw", "w", "nw", "not directional", "positive direction", "negative direction", "both directions", “unknown”
route-designator	The name of the route the device is located at	String.

3.2.3.4 Intersection Signal Control Status Data

organization-id	ID of owning organization	String.
organization-id	ID of owning organization	String
organization-name	Name of owning organization	String
device-id	Device identifier	Unique ID
device-status	Device functional status	Enumeration. Valid values include: “on”, “off”, ”failed”, and ”unknown”.
device-comm-status	Device communication status	Enumeration. Valid values include: “operational”, “offline”, “failed”, and “unknown”.
last-comm-time	Time stamp of last communication status	Date-time-zone object.
signal-control-source	Source which commanded current signal status	Enumeration. Valid values include: "unknown", "other", "central time base coordination intersection", "central operator commanded intersection", "central time base coordination section", "central operator commanded section", "local", "local time base coordination", "local manual", "local backup loss of central"
current-signal-timing-mode	Current timing mode	Enumeration. Valid values include: "unknown", "other", "free", "fixed time", "actuated", "semi actuated", "critical intersection control", "traffic responsive", "adaptive",

		"flash-programmed", "conflict-flash", "free due to fault", "flash-automatic", "flash preempt", "flash local manual", "flash fault", "flash mmu-cmu", "flash reasons unknown", "flash startup", "special function", "coordinated alarm", "transition"
timing-pattern-id-current	Current signal plan ID	String.
actuation-mode	Current actuation mode	Enumeration. Valid values include: "unknown", "other", "fixed-time", "semi-actuated", "fully-actuated"

3.2.3.5 Detector Inventory Data

Data Field	Definition	Format / Example
organization-id	ID of owning organization	1
organization-name	Name of owning organization	Port of Long Beach
device-id	Device Identifier	100
latitude	Latitude of the device location	34.03581
longitude	Longitude of the device location	-118.53575
device-name	Device name or description.	
last-update-time	Last update time of inventory information	
device-control-type	Control type requested by the external center	
link-direction	Direction of the link the device is located at	
route-designator	The name of the route the device is located at	
detector-inventory-header	Same header information as for detector station	
detector-type	Type of detector (String enumeration)	"inductive loop", "magnetic", "magnetometers",

		"pressure cells", "microwave radar", "ultrasonic", "video Image", "laser", "infrared", "road tube", "other", "unknown"
lanes	List of lane numbers associated with this detector	
vehicle-classification-bin1/2/3/4	Length of each bin (1 through 4) in centimeters	

3.2.3.6 Detector Status Data

Data Field	Definition	Format / Example
organization-id	ID of owning organization	String
organization-name	Name of owning organization	String
device-id	Device identifier	Unique ID
device-status	Device functional status	Enumeration. Valid values include: “on”, “off”, ”failed”, and ”unknown”.
device-comm-status	Device communication status	Enumeration. Valid values include: “operational”, “offline”, “failed”, and “unknown”.
last-comm-time	Time stamp of last communication status	Date-time-zone object.
detector-status-header	Same header information as for detector station	Various
detector-lane-number	Detector lane number	Integer numbers, 1 – 255

3.2.3.7 Detector Measurement Data

Data Field	Definition	Format / Example
organization-name	Name of owning organization	String
detector-id	Detector Identifier	Unique ID
detection-time-stamp	Time stamp of last communication status	Date-time-zone object.
vehicle-count	Vehicle count in vph (vehicles per hour)	Integer
vehicle-occupancy	Detector occupancy in percent	Integer,

		0 – 100
start-time end-time	Start and end timestamps of measurement interval	Date-time-zone object.
detector-data-type	Type of detector data	Enumeration. Valid values include: "actual", "reconstructed", "historical", "predicted", "smoothed", "averaged", "estimated"
vehicle-speed	Speed in **kilometers per hour (kph)**	Integer, 0 – 255

3.2.3.8 Event Data

Data Field	Definition	Example
organization-id	Name of sending organization	Always set to "Concert"
date	Date message was sent	yyyymmdd
time	time message was sent. Times are in UTC (GMT) time	hhmmss
offset	Time zone offset (from UTC)	phhmm -0400 (daylight time, summer) -0500 (standard time, winter)
event-id	Event identifier	Unique integer
update-time (date, time, offset)	Time the event was last updated	*Same definitions as date, time, offset above.*
active-flag	Indicates whether the event is currently active or not. *inactive events may be unconfirmed events and should not be published on 511.*	yes no
severity	The severity of the event. NEXTCONNECT levels: 1=none, 2=minor, 3=major, 4=major.	none minor major
status	The status of the event. "planned" means the event occurs in the future. "reported" is an unconfirmed incident (do not publish) "current" means an active event "ended" is an expired event.	planned reported current ended
event-headline	Defines event type.	<accidents-and-incidents>

	One of the listed tags will appear in this section. Subtypes are defined below.	<obstruction> <pavement-conditions> <sporting-events> <special-events> <roadwork> <traffic-conditions> <visibility-and-air-quality> <winds>
latitude	Latitude in micro degrees	Integer
longitude	Longitude in micro degrees	Integer
link-name	Name of roadway selected	String from defined street list
cross-street-name-item	Name of cross street or milepost.	MM n (where n is a milepost number) or string from defined street list.
secondary-location	If event location is a from/to range, the "to" location will be sent as the secondary location	Same format as primary location
link-direction	Direction of travel of roadway selected	e w n s
expected-end-time	End time of event	Same as time format above.
start-time	Time event started	Same as time format above
lanes-total-original	Total number of lanes at site	Integer
lanes	List of lane numbers affected, one <lane> tag per lane.	Integer
event-name	Name of event. The name is just a string and is not required to be unique.	String

3.2.3.9 DMS (Dynamic Message Sign) Inventory Data

Data Field	Definition	Format / Example
organization-id	ID of owning organization	String.
organization-name	Name of owning organization	String.
device-id	Device Identifier	Unique ID
device-location	Device latitude / longitude location	Integers, in micro degrees
device-name	Device name or description.	String.
last-update-time	Last update time of inventory information	Date-time-zone object.
device-control-type	Control type requested by the external center	String enumeration. Valid values include "status only", "command only",

		"status and command", and "not specified".
dms-sign-type	DMS sign type, if known.	String enumeration. Valid values include "variable message sign VMS", "changeable messages sign CMS", "blank out sign BOS", "portable VMS", and "other".

3.2.3.10 DMS (Dynamic Message Sign) Status Data

Data Field	Definition	Format / Example
organization-id	ID of owning organization	String
organization-name	Name of owning organization	String
device-id	Device identifier	Unique ID
device-status	Device functional status	Enumeration. Valid values include: "on", "off", "failed", and "unknown".
device-comm-status	Device communication status	Enumeration. Valid values include: "operational", "offline", "failed", and "unknown".
last-comm-time	Time stamp of last communication status	Date-time-zone object.
current-message	Current message on DMS	MULTI formatted string message. A detailed description and syntax of the MULTI format can be found in the NTCIP 1203 standard.

3.2.3.11 Link Inventory Data

Data Field	Definition	Format / Example
organization-id	ID of owning organization	String.
organization-name	Name of owning organization	String.
network-id	Network ID. ID of owning organization.	Unique ID
link-id	Link Identifier	Unique ID
link-route-designator	Name of the link.	String
link-type	Type of link.	String enumeration. Valid values include: "freeway",

		"arterial", "collector", "local", "service road", "tunnel", "detour", "dedicated link", "military road", "railroad link", "air link", "ferry", "on-ramp", "off-ramp", "dedicated-hov-link", "toll-road", "unknown", and "other".
link-begin-node-id	ID of beginning node.	0 if unknown.
link-begin-node-location	Latitude and longitude location of the begin node, in microdegrees.	0, 0 if unknown.
link-end-node-id	ID of the end node.	0 if unknown.
link-end-node-location	Latitude and longitude location of the end node, in microdegrees.	0, 0 if unknown.
last-update-time	Last update time of inventory information	Date-time-zone object.

3.2.3.12 Link Status Data

Data Field	Definition	Format / Example
organization-id	ID of owning organization	String.
network-id	Network ID. ID of the owning organization	Unique ID
link-id	Link Identifier	Unique ID
link-name	Link name	String
link-status *	Link name	String enumeration. Possible values are "no determination", "open", "restricted", and "closed".
link-direction	Direction of travel reference on a link	String enumeration. Possible values are "any other", "n", "ne", "e", "se", "s", "sw", "w", "nw", "not directional", "positive direction", "negative direction", and "both directions"
link-traffic-data-algorithm **	The method of calculation for the data.	String enumeration. Possible values are "actual", "reconstructed", "historical", "predicted", "smoothed", "averaged", and "estimated".
travel-time	Average link travel time	Integer (seconds).

speed-average	Average link travel speed	Integer (km per hour).
occupancy	Average percent of occupancy	Integer (percentage in the range 0-100).
volume	Link volume	Integer (vehicles per hour)
last-update-time	Last update time of status information	Date-time-zone object.

3.2.3.13 Highway Advisory Radio (HAR) Inventory Data

Data Field	Definition	Format / Example
organization-id	ID of owning organization	String.
organization-name	Name of owning organization	String.
device-id	Device id.	Unique ID
device-name	Name of the HAR	String
location	Device latitude / longitude location	Integers, in microdegrees.
device-control-type	Control type requested by the external center	String enumeration.
controller-description	Controller description	String.
node-id	Node ID	String
node-name	Node name	String.
link-direction	Direction of travel referenced on a link	String enumeration.
route-designator	Route number	String
device-url	Url reference	String.
last-update-time	Last update time of inventory information	Date-time-zone object.
device-beacon	Indicator of the associated beacons with a device	String enumeration.

3.2.3.14 Highway Advisory Radio (HAR) Status Data

Data Field	Definition	Format / Example
organization-id	ID of owning organization	String
organization-name	Name of owning organization	String
device-id	Device identifier	Unique ID
device-status	Device functional status	Enumeration. Valid values include: “on”, “off”, ”failed”, and ”unknown”.
device-comm-status	Device communication status	Enumeration. Valid values include: “operational”, “offline”, “failed”, and “unknown”.
last-comm-time	Time stamp of last communication status	Date-time-zone object.

har-current-message	Current message on HAR.	String
message-beacon	Status of HAR beacon.	Byte. 1 indicates the HAR beacon is on.
har-status-ext	Contains Siemens extension to the HAR status message, including details of the playlists.	Complex type.
msg-id	ID of the message in the playlist.	String.
msg-name	Name of the message in the playlist.	String.
msg-text	Text of the message in the playlist. Note that the har-current-message item should contain a concatenated list of all messages.	String.

3.2.4 Traffic Data Format from Nokia

Traffic data can be acquired from Nokia via a RESTful API.

3.2.5 Traffic Data Format from Inrix

3.2.5.1 Incidents Data

Attribute	Required	Type	Usage
id	yes	string	The unique identifier associated with the incident
version	yes	version	The version of the incident report
type	yes	integer	The type of incident: 1=Construction, 2=Event, 3=Flow, 4=Incident, 6 = Police
severity	yes	integer	The severity of the incident. This value can be in the range of 0-4, with 4 indicating the highest severity.
eventCode	yes	integer	The event code associated with the incident
latitude	yes	double	The latitude of the incident
longitude	yes	double	The longitude of the incident
impacting	yes	boolean	Indicates if the incident is impacting traffic
startTime	yes	DateTime	Indicates when the incident starts
endTime	yes	DateTime	Indicates when the incident ends

Element	Required	Occurs	Description
ShortDesc	no	0..1	Short textual description of the incident
FullDesc	no	0..1	Longer textual description of the incident
TMCs	yes	1	Container for the TMC element indicating the TMCs located at the incident
DelayImpact	no	0..1	Information about the delay caused by the event
ParameterizedDescription	no	0..1	Detailed information about the event specified in the eventCode attribute
RDS	no	0..1	Radio Data System data.

3.2.5.2 Traffic Data

Data Field	Definition	Format / Example
timestamp	Time stamp	2012-06-13T17:02:14Z
TMC Code	Code that identifies the TMC	101+12007
Speed	The current speed, in kilometers per hour	37
Average	The typical speed, in kilometers per hour	35
Delta	The difference between the average and current speed	2
TravelTimeMinutes	Travel time in minutes	2.527
CongestionLevel	The level of congestion, on a scale of 0 to 3	3

3.2.6 Traffic Data Format from Municipal TMCs

Arterial data for the City of Los Angeles is provided as part of the RIITS data.

3.2.7 Data From TENS

TBD

3.2.8 Traffic Data From I710 ZEFC

TBD

3.3 DATA INTEGRATION ENGINE

GoFreight shall receive real-time traffic data from its sources, convert the data into a data format that is useable for GoFreight, and store the data in the GoFreight TIS database. The Contractor shall develop the algorithm to convert the received traffic data into a format that can be stored in the GoFreight TIS database. The Contractor shall design the GoFreight TIS database with a structure that will serve the needs of the GoFreight website, mobile app, and IVR.

GoFreight shall send requests to the APIs of the data sources at pre-determined frequencies. Such frequencies shall be optimized for each type of data and for peak and non-peak hours of traffic. GoFreight shall store the API keys and provide an interface to update the API keys.

In the event that data response failed to be received from a source, GoFreight shall be able to revert to a secondary data source, if available and utilize the secondary data until the primary source becomes available again.

4 OUTPUTS AND INTERFACES

GoFreight shall provide integrated freight-focused traffic data that includes arterial and freeway speeds, travel times, incidents, alerts, and port gate queue times, to public agencies and private organizations. The integrated data shall be disseminated via an interface that shall be established when a request is received from the external party.

4.1 DATA DISSEMINATION INTERFACE

4.1.1 Data Dissemination API

The Contractor shall develop an Application Programming Interface (API) for GoFreight that allows software from public agencies or private companies to retrieve freight traveler information from GoFreight via the internet. Authorized parties will be issued an API key code by the Agency. The authorized party shall be enabled to make API calls with the API key code embedded in http requests. If GoFreight receives an API call with the correct format and key, it shall respond by transmitting the requested traffic data to the requesting party. If the API receives an invalid API call, it shall respond by transmitting an error message that corresponds to the type of error to the requesting party.

4.1.2 API Data Formats and Documentations

GoFreight shall transmit freight traffic data in two available formats. One shall be XML format and the other shall be JSON format.

The following documentation shall be available to authorized parties:

- Design of the data schema that describes the data available;
- Specification of the format and data-types;
- Sample XML and JSON files
- Sample Codes in multiple programming languages, including Java, Microsoft .NET, PHP, and Object C.

4.1.3 Resources to be Disseminated

The GoFreight API shall enable users to receive the following resources:

- Get Arterials Links: Return the arterials links configuration and travel time in GoFreight;
- Get Freeway Links: Return the freeway routes configuration and travel time in GoFreight;
- Get Events: Return events and incidents information in GoFreight;
- Get Ports: Return port gates configuration and queue time in GoFreight;
- Get Cameras: Return camera configuration and camera image file URL in GoFreight; Camera images shall contain time-stamps and shall be cached no more than 1 minute.
- Get Alerts: Return alerts in GoFreight.

GoFreight shall allow additional resources to be added to the list for dissemination.

4.1.4 API Rate Limit

GoFreight shall allow an authorized party to make authenticated API calls at the maximum rate of one call every 60 seconds. If an authorize party makes an API call at a rate that is higher than the rate limit, GoFreight shall return an error message that indicates the maximum rate has been exceeded.

4.1.5 Error Codes & Responses

GoFreight shall return API calls with the appropriate status code for every request. The following statuses shall be coded:

- 200 Successful Call
- 400 Bad Request
- 403 Forbidden
- 404 Not Found
- 500 Internal Server Error
- 503 Service Unavailable

4.1.6 Live and Test Environments

GoFreight shall be accessible to users in both the live environment and a test environment. The live and test environments shall be independently deployed and shall not share the same server or other resources. The test environment shall be provided to enable users to develop applications that utilize GoFreight data.

Test API keys shall be made available to authorized developers in other agencies or private organizations to connect to the test environment. Live API keys to the live environment shall be made available to parties authorized by the Agency. Test API keys and live API keys shall not be the same.

5 OPERATIONAL REQUIREMENTS

5.1 GOFREIGHT DEVELOPMENT

5.1.1 Choice of Technologies

GoFreight shall be developed using state-of-the-art technologies. The Contractor shall select a proven set of technologies and software development platforms that are highly stable, scalable, and economical, which may be represented by, but not limited to, the following technologies:

Microsoft .NET and SQL Server.
LAMP: Linux, Apache or Nginx, MySQL, PHP or Python.
Oracle
Java
Object C.

Some of these technologies have been employed for related systems including the LA Metro RIITS, Go511, and the USC ADMS projects. Since GoFreight may interface with some of these systems, the Contractor is encouraged to consult with AGENCY regarding the technology selection for GoFreight.

In selecting vendor-provided data, technologies, and/or services, the Contractor shall conduct thorough due-diligence and obtain approval from Agency before making any major selections.

5.1.2 Software Development

The Contractor shall employ state-of-the-art software development and project management practices for the development of GoFreight. The Contractor shall submit for Agency approval a development plan and that includes the resumes for the proposed development team.

5.2 GOFREIGHT OPERATIONAL REQUIREMENTS

5.2.1 System Performance

There are currently an estimated 17,000 freight drivers and 500 freight dispatchers in the Gateway Cities region. The GoFreight Website, GoFreight App, and GoFreight IVR shall be designed with sufficient capacity to support the traveler information needs of these users. The Contractor shall perform an analysis to determine the worst case loading of the website, app, and IVR prior to the GoFreight design <CDRL>. The analysis shall include the following estimated worst case loads:

- unique visits to the website per day
- website page views per day
- concurrent users of the website at any time

- unique visits to the app per day
- concurrent app users at any time
- number of concurrent IVR callers, by period of day
- number of concurrent IVR callers requiring assistance by an attendant, by day of week and period of day.

The analysis shall also determine the worst case number of API calls per minute and worst case amount of bytes of data to be disseminated by the Data Dissemination Subsystem GoFreight shall be designed so that the maximum response time to an API call is 100 millisecond, excluding delays due to network latency.

5.2.2 Reliability and Availability

GoFreight shall be operational 99.9% of the time, excluding downtimes for scheduled maintenance or upgrades.

The Contractor shall design GoFreight to achieve high availability through the implementation of highly reliable and maintainable subsystems and System Components, elimination of single points of failure, implementation of self-diagnostics features and robust systems to report failures.

The Contractor shall submit a reliability, availability and maintainability report that shall include data for each system element and analysis and calculations that demonstrate compliance with these requirements <CDRL>.

Downtime for scheduled maintenance or upgrades shall only take place from 12AM to 5AM on weekends and/or holidays, when freight traffic is expected to be low. The Contractor shall provide Agency and recipients of the data dissemination data at least a seven-day notice before a scheduled downtime. Advanced notices shall be sent to users who utilize GoFreight data for their own information systems at least TBD days before a scheduled downtime.

During an emergency shutdown period, the GoFreight website shall display a page that notifies users that GoFreight is temporarily down, with status updates as they become available. The temporary page shall also display or provide links to the following:

- Go511 website
- A third party real-time traffic map for the Gateway Cities region;
- Caltrans and LA Metro websites
- A list of radio stations with traffic reports;

During an emergency shutdown, the GoFreight App shall display an error page notifying the app users that the system is down and list of alternative resources that would be appropriate for app users, including a list of radio stations with traffic reports.

During an emergency shutdown, the GoFreight IVR shall play a recording advising callers that the system is down and to call 511 for traffic information.

5.2.3 Maintainability and Expandability

GoFreight shall be designed using off-the-shelf hardware and software to the maximum extent possible and shall be designed using Open System Architectures.

Open Systems Architectures, as used in the context of the GoFreight design, are systems that achieve the following objectives:

- Utilize components that have interfaces that are fully documented, non-proprietary, and based on a standard that is recognized by a standards-making body, such as IEEE, ANSI, SAE, and CCITT
- Utilize components that are manufactured by several sources or are readily commercially available
- Utilize components whose internal workings are fully documented and understood by a significant user and support community
- Utilize custom components that were developed and documented in accordance with recognized programming architecture and standards and quality assurance procedures

GoFreight shall be designed and implemented in a modular fashion so that GoFreight can be launched incrementally by modules.

The Contractor shall design GoFreight such that multiple versions of GoFreight can be in use by GoFreight clients at the same time. The Contractor shall carefully document each version release for use by the tech support staff.

Option: The GoFreight IVR shall include text to speech capability for the creation of new freeway, arterial, hotspots, and freeway exit audio files.

5.2.3.1 Support for New Data Inputs

GoFreight shall be designed to facilitate future additions of new data inputs with open, fully documented interfaces.

5.2.3.2 Support for New Enhancements and New Functionality

GoFreight shall be designed such that individual components or subsystems can be added or updated to a newer version without requiring an entire system upgrade. The Contractor shall employ a modular design approach and utilize object–oriented programming.

5.2.4 Security

GoFreight shall be developed in accordance with the prevailing security standards for internet applications. At a minimum, registration, login, and password reset processes shall be encrypted with 256-bit SSL.

GoFreight shall safeguard the following types of information:

- User ID
- Password and pin
- Names and email addresses
- Mobile device IDs
- Personalized data, such as favorite routes and destinations
- User location, unless the user has consented to being followed.

GoFreight shall include administrative tools that restrict access to user account data such that only personnel who are responsible for the maintenance and monitoring of the system have access to the data. The Contractor shall provide documentation of the GoFreight security plan for Agency approval. <CDRL>

Keys to the Data Dissemination API shall be strictly limited to authorized recipients. The Contractor shall develop and implement a plan to document all authorizations for access.

5.2.5 Privacy

GoFreight shall be developed in accordance with the prevailing privacy standards of internet applications.

The GoFreight privacy policy shall be displayed on the website and mobile app. GoFreight shall enable users to be able to manage the privacy settings for their accounts.

5.2.6 Server Type and Hosting Environment, and Facilities Location

The GoFreight back end system and facility for the IVR attendants could be located at any number of regional locations. A preferred location would be to co-locate the equipment with the Go511 servers and the IVR attendants with the Go511 attendants, but GoFreight could also be housed in a stand alone facility that the Gateway Cities builds and maintains. The servers should also be hosted in a cloud environment.

The Contractor shall provide a recommendation for the GoFreight servers and hosting environment and housing location for the IVR attendants. The Contractor shall provide an analysis document for Agency review that lists and analyzes the options for the server and hosting environment and facilities location.

5.2.7 Storage and Archiving

GoFreight shall archive the data stored in its databases for a minimum of two years. The Contractor shall provide projections of the storage space needed and provide a schedule to deploy additional storage capacity.

5.2.8 Backup and Fail-over

The Contractor shall develop and implement a backup and fail-over system for GoFreight. The backup system shall be deployed in an environment that is independent of the primary GoFreight servers.

The Contractor shall notify GoFreight Data Dissemination recipients of the backup system. This will enable the recipient to redirect their API calls to the backup data dissemination system in the event of a failure at the main GoFreight system.

6 NON-FUNCTIONAL REQUIREMENTS

6.1 WEBSITE & APP GENERAL REQUIREMENTS

6.1.1 Look and Feel

The look and feel and GUI for the GoFreight Website and GoFreight App shall be consistent with the Go511 site and Go511 app, respectively. Where applicable, modern design principles shall be utilized to ensure that the website and app are simple to understand and use. The webpage and app shall accommodate users of varying technical skill levels.

6.1.1.1 Layout

The layouts of the GoFreight Website and GoFreight App shall be consistent with the Go511 site and Go511 app, respectively. The layout shall be logical and allow information to be easily accessible to users of various technical skill levels.

6.1.1.2 Font

The fonts used for the GoFreight Website and GoFreight App shall be consistent with the Go511 site and Go511 app, respectively.

6.1.1.3 Users

The Contractor shall develop different user roles for GoFreight. GoFreight shall enable user to be assigned with one or more roles and to be able to access different functionalities on the system, accordingly.

Admin users: Different admin user roles shall be developed. In addition to being a standard registered user, an Admin user may have one or more of the following admin roles:

- Super admin: Able to manage other admin users as well as performing functions of all user types
- Data admin: Able to manage data on the system
- Report admin: Able to generate reports
- Website admin: Able to manage text or graphical elements of the website

6.1.2 Cultural Requirements

English shall be the default language but GoFreight shall allow the user to select Spanish. The user's language preference shall be stored as a cookie for future use. If the user selects Spanish, GoFreight shall retain this language selection for future sessions.

The Spanish version of GoFreight shall not be a straight translation of the English version. The Spanish version shall be developed such that its look and feel appeals to native Spanish

speaking users. The Contractor shall conduct focus groups with Spanish speaking users and modify the Spanish version to suit their needs.

6.1.3 Political Requirements

TBD

6.1.4 Legal Requirements

The Contractor shall design the GoFreight website and app to comply with all applicable Federal and local laws.

6.2 IVR GENERAL REQUIREMENTS

6.2.1 User Experience

The user interface for GoFreight's IVR shall be consistent with the Go511 IVR. Where applicable, modern design principles shall be utilized to ensure that the IVR is simple to understand and use. The IVR shall accommodate users of varying technical skill levels.

6.2.1.1 Menus

The menus for GoFreight's IVR shall be consistent with the Go511 IVR. Where applicable, the menus shall be designed to allow users to easily flow through the IVR in order to access desired information.

6.2.1.2 Terminology and Language Style

The terminology and language system for GoFreight's IVR shall be consistent with the Go511 IVR.

6.2.2 Cultural Requirements

English shall be the default language. The GoFreight IVR shall allow the user to select Spanish. If the user selects Spanish, GoFreight shall retain this language selection for the user such that Spanish is automatically selected when the user logs in.

The Spanish version of GoFreight IVR shall not be a straight translation of the English version. The Spanish version shall be developed such that its look and feel appeals to native Spanish speaking users. The Contractor shall conduct focus groups with Spanish speaking users and modify the Spanish to suit their needs.

6.2.3 Political Requirements

TBD

6.2.4 Legal Requirements

The Contractor shall design the GoFreight IVR to comply with all applicable Federal and local laws.

6.3 MANUALS

This section identifies the manuals to be provided to support training and give on-going documentation needed for AGENCY staff to manage, operate, maintain, and expand GoFreight.

6.3.1 Manual Users

The Contractor shall provide to AGENCY, hardcopies of manuals for their staff and third party data users in the quantities listed in Table 6-1, below <CDRL>:

Table 6-1 Manual Hardcopy User Type and Quantity

User Type	Quantity
Computer system administrator	5
Data administrator	5
3rd Party Data User	100
IVR Attendant	20

6.3.2 General Requirements for Manuals

6.3.2.1 Development Process

The Contractor shall prepare a complete plan for providing the manuals described herein. The plan shall include at least the following:

- The Contractor shall submit for approval the outline of each manual as a part of the Preliminary Design Review <CDRL>.
- The Contractor shall develop and submit a draft version of each manual submitted with the Final Design Review <CDRL>.
- The Contractor shall deliver one complete set of manuals prior to the start of the acceptance testing <CDRL>.
- The Contractor shall incorporate information gathered during implementation and acceptance testing periods into the manuals for the updated and final submittal <CDRL>.

6.3.2.2 Content

The manuals shall contain all of the informational material required to support the area of activity and include all information to be covered for the associated user training classes.

All manuals shall conform to the following:

- Be in concise form, with minimal redundancy
- Be organized in clear, logical fashion, and indexed and tabbed for rapid access
- Be in English
- Be written for comprehension by persons with a high school education (IVR attendants) and college level education for the other manuals
- Contain table of definitions for all abbreviations, acronyms, and special terms

6.3.2.3 Medium and Formats for Delivery

6.3.2.3.1 Hardcopy

The Contractor shall deliver to AGENCY the quantities of manuals specified in Table 6-1 in hardcopy form, with appropriate binding and labeling.

All hardcopy manuals shall conform to the following:

- Manuals shall be designed for continuous, long-term service.
- Manuals shall lie flat when opened.
- Pages shall be printed on both sides.
- Manuals shall permit adding and replacing pages.
- Covers shall be oil, water, and wear resistant.

6.3.2.3.2 Softcopy

In addition, the Contractor shall deliver to AGENCY electronic copies of the manuals and their components that are developed by the Contractor, or by vendors in response to the Requirements.

The following guidelines regarding electronic copies of the manuals shall be met:

- The electronic form shall consist of two copies of each final manual on an electronic storage medium (CD-ROM or other approved media).
- The format of the storage medium shall be one that is widely used and easily available to AGENCY.
- The manuals shall be stored as MS Word, Portable Document File, or other AGENCY -approved format.

6.3.3 System Administrator Manual

The Contractor shall provide a system administrator manual that provides a clear, organized description of all of the GoFreight computers, servers, telephone equipment, and network infrastructure as well as the tools and procedures for managing their configuration, and for diagnosing their performance and problems.

At a minimum, the manual shall contain the following information:

- Configuration and operation of the GoFreight servers, telephone equipment, and GoFreight WAN/LAN
- Use of performance measurement and analysis tools
- Reconfiguration of equipment around failures
- System backup
- Implementation of failover to backup servers and devices
- Restoration of equipment and data after failures
- Management of system access, security features, user accounts and passwords, and user privileges
- Installation of software updates provided by the Contractor and third-party software suppliers
- Use of software configuration management and administration tools and system test tools
- Instructions on the release and management of new GoFreight versions
- Management of the GoFreight test environment
- Overview of the structure, organization, and functionality of the system software, application software, and databases
- A high-level and detailed description of the computer/server configurations, telephone equipment, configuration of GoFreight LAN/WAN logical and physical entities, and connections to the Data Integration Engine database, and the AGENCY LAN/WAN
- Description of the interfaces to connected systems including the AGENCY LAN/WAN, RIITS, Go511, and 3rd Party Data Users/Application Developers
- A listing and functional description of the software components for each computer/server
- Computer startup, IVR startup, interconnected systems restart, and shutdown procedures
- Overview and details of procedures and tools for installing and verifying new software and rolling back old software for the Data Integration Engine, Data Dissemination subsystem, and IVR subsystem
- Monitoring, analysis, and optimization of computer, telephone equipment, LAN, and WAN performance
- List of the most common failures
- Equipment and operating system error messages and diagnostics, and their remedial actions
- Tools and procedures to troubleshoot equipment and software problems on all GoFreight equipment, including the GoFreight LAN and WAN
- Interpreting and responding to messages generated by error-monitoring software
- Procedures to manage and diagnose interfaces with connected systems

6.3.4 Data Administrator Manual

The Contractor shall provide a data administrator manual that provides a clear and organized description of all GoFreight databases. At a minimum, the manual shall contain the following information:

- Structure, interfaces, and functions of the GoFreight software and databases
- Database documentation for all real-time and historical databases including the configuration, individual elements (files, records, fields, views, and tables), relationships, and security settings for each GoFreight database. The documentation shall include, but not be limited to, entity-relationship diagrams (ERD) and a complete listing of the data dictionary for each database. Any portions of the databases that were developed, modified, or enhanced specifically for GoFreight shall be identified.
- Tools and procedures for managing the database configurations
- Procedures for diagnosing problems and repairing the databases
- Configuration and maintenance of all GoFreight databases
- Updating the base map database (if needed) by importing revised base maps as well as any other pertinent map features
- Monitoring, maintaining, archiving, and restoring the GoFreight databases
- Updating the GoFreight Website
- Updating the GoFreight App
- Updating the GoFreight IVR
- Creating and loading new messages, audio files, menus, and pull down lists for the website, app, and IVR subsystem
- Distribution of data updates to 3rd party data users
- Maintaining and tuning the databases using database management tools
- Maintaining interfaces with existing external systems
- Developing interfaces to new external systems, data imports and exports, and APIs
- Creating new API keys
- Management of data archives
- External interfacing data formats, semantics, and protocols.
- Description of data interfaces, tasking, considerations for timing, priorities, and resource use
- Programming and database maintenance tools used to create the GoFreight software
- Procedures for building and managing software export tools
- Procedures for building and managing data import tools
- Procedures for building and managing software configuration
- Identification of error conditions detected within the software, and the messages or indications for those conditions
- Identification of parameters used to adjust GoFreight operation
- Procedures to diagnose GoFreight software functional or performance problems
- Procedures to identify expansion and upgrade needs
- Procedures to install and test new software
- Reviewing data reports generated by GoFreight

6.3.5 3rd Party Data User Manual

The Contractor shall provide a 3rd Party Data user manual that provides a clear and organized description of the data being made available by GoFreight as well as procedures for requesting and receiving the data from GoFreight. At a minimum, the manual shall contain the following information:

- Structure, interfaces, APIs, and functions of the GoFreight software and databases

- Procedures for requesting access to data through the GoFreight
- Examples of sample data formats

6.3.6 IVR Attendant Manual

The Contractor shall provide an IVR Attendant manual that provides a clear and organized description of the data that is available to users of the GoFreight IVR subsystem, the structure and menu flow of the IVR subsystem, as well as procedures for assisting users to maneuver through the IVR subsystem when they encounter a difficulty. At a minimum, the manual shall contain the following information:

- Overview of GoFreight and its subcomponents
- Structure and functions of the GoFreight IVR subsystem
- Procedures for assisting users with the IVR subsystem functions
- Procedures for navigating users through the GoFreight IVR menus
- Examples of common issues users might encounter and how to help resolve them
- Special instructions for Spanish speaking users

6.4 TRAINING

This section identifies the training to be provided to transfer to AGENCY staff the knowledge and skills needed to enable personnel to utilize, manage, operate, maintain, and expand the GoFreight system.

6.4.1 Courses and Trainees

At a minimum, the Contractor shall provide training, training materials, and tools to the GoFreight user types listed in Table 6-2.

Table 6-2 Training Classes for AGENCY

User Type	**Informal Training (Days)**	**Formal Training (Days)**	**Follow Up Training (Days)**	**Max Students /Class**	**# of Classes**
Computer system administrators	0.5	1	2	4	1
Data administrators	0.5	1	2	4	1
3rd party data users and trainers	0.5	0.5	0.5	20	2
IVR attendants and trainers	0.5	0.5	0.5	10	10

The course for 3rd party data users shall include both training in the subject matter and how to present the training from the Trainer's Guide. The Contractor shall present and then make enhancement to the course as often as necessary to improve the quality and completeness of the course.

In addition to the classroom training, the Contractor shall provide computer-based self-study tools for vehicle operators to refresh themselves on procedures.

6.4.2 Training Plan

The Contractor shall submit for AGENCY approval, within sixty (60) days after NTP, a complete plan for providing the training described herein <CDRL>. The training sessions shall be scheduled between the completion of design and the start of installation. The training plan shall include the following information for each course and class:

- A statement of the goals of the training of each course. Among these goals shall be an understanding of how GoFreight will benefit the freight community.
- An overview of delivery methods for the course, including hands-on and group work experience
- The course objectives for trainees, each of which shall be measurable, shall include the conditions of measurement, and shall state the performance or level of success that must be achieved for each learner
- An evaluation plan, including criteria for success of the course, based upon the goals and objectives, and evaluation steps and instruments to be employed
- A list of the equipment, tools, manuals, and other materials to be used as trainee and trainer aids
- A list of training site requirements
- A proposed schedule for each class that is linked to the development and implementation process and constrained by availability of trainees away from regular duties. Training shall be completed before final implementation of GoFreight. Training shall not take place more than two months before the first fullscale release of GoFreight.
- A list of AGENCY operating policies and procedures that will be integrated into the course
- A description of the pre-requisite knowledge for each course. The Contractor may assume each trainee has worked in a similar role to that intended for the trainee.
- A plan for developing or customizing course material
- Resumes of personnel proposed to be trainers for each class, demonstrating that they are experienced, effective training professionals

6.4.3 Course General Requirements

The Contractor shall submit two copies plus one electronic copy of a complete description for each course listed in Table 6-2, no later than sixty days prior to the scheduled start of the first class for that course, for AGENCY approval <CDRL>.

The courses shall be developed under the guidance of a professional courseware developer. The training shall include hands-on training using the latest versions of GoFreight.

Presentation methods for courses shall conform to the following:

- Be founded on an explicit sequencing strategy based on typical trainee characteristics

- Serve multiple learning styles
- Be heavily hands-on or group-based, particularly for skills development
- Contain tell-show-coach-evaluate sequences for skills
- Contain group and cooperative learning
- Include role play when dealing with human interactions
- Provide for independent reading, with workbook, manuals, or computer workstation
- Provide both in-class and independent learning

Each course description shall contain, as a minimum, the following information:

- A statement of the sequencing strategies used
- A detailed outline of the training steps to be taken in the course, the course objectives to be met by each step, the learning style addressed, the duration (in minutes) for each training step
- Copies of the course materials, including trainee readings, workbooks, job aids, lecture note sheets, audio and visual aids, computer-based material, manuals, as-built documentation, and other printed materials to be used during the course
- Description of all other training aids, materials, tools and equipment
- Detailed descriptions of the procedures to be performed by trainees during hands-on training or group work
- AGENCY operating policies and procedures that are integrated into the course

Factory-authorized training including configuration and maintenance procedures shall be provided on all equipment before installation.

6.4.4 Course Materials

The course materials—including manuals, workbooks, job aids, lecture note sheets, handouts, situational (case study) and procedural audio and visual aids—shall be of high quality. Course materials shall accurately reflect the software and hardware configuration and operation.

The organization and content of course materials shall be directed clearly to course objectives. There shall be no extraneous material. The material shall be organized into the order of presentation (except for reference exhibits). The language used shall be at a level that is appropriate for the particular training group, with concise statements and well-structured paragraphs. All terms shall be defined. The material shall assume the appropriate prerequisite knowledge.

The course material shall be of uniform appearance and style, across documents (page layout, fonts, pagination) and within each class of material (quizzes, case studies, text, etc.). Page layouts shall use high contrast and low density to enhance interest. Key points shall be highlighted and graphics shall be used that support the content.

The course printed materials shall be assembled for ac in-class and on-job reference accessibility, with tabbed sections and content-related labels.

The course test and evaluation instruments shall be included. These shall measure progress against objectives (including attitudinal or affective objectives). They shall also measure the trainees' response to environment, instruction quality, and content quality. Tests for pre-requisite knowledge, post-course, and on-the-job knowledge shall be included. The Contractor shall provide software tools for capturing and summarizing test and evaluation results. The test results shall be reviewed by the Contractor and AGENCY and changes shall be made to the course material as a result of this review.

The Contractor shall provide sufficient training materials for each trainee for each course listed in Table 6-2 <CDRL>. The Contractor shall provide all special tools and equipment that are in sufficient quantity to support the schedule of classes in the Training Plan.

6.4.5 Course Content

6.4.5.1 System Administration Staff

The IT staff responsible for the oversight of the GoFreight hardware shall receive a training course that includes the following topics:

- Configuration and operation of the GoFreight computer hardware, and GoFreight WAN, and LAN equipment
- Use of performance measurement and analysis tools
- Reconfiguration of equipment around failures
- Troubleshooting
- System backup
- Interpreting and responding to messages generated by error-monitoring software
- Failing over to backup servers and devices
- Restoration of equipment and data after failures
- Management of system access, security features, user accounts and passwords, and user privileges
- Installing software updates provided by the Contractor and third-party software suppliers
- Use of software configuration management and administration tools and system test tools
- Management and maintenance of the GoFreight computer hardware, LAN, WAN, and associated hardware

The course also shall include an overview of the structure, organization, and functionality of the system software, application software, and databases—providing the necessary understanding to allow the system administrator to provide maintenance of the GoFreight system software effectively. The informal training shall be completed before the GoFreight deployment. The formal training shall utilize the final GoFreight software versions and associated documentation.

The materials and facilities needed include the Computer System Administrator manuals, workbooks, and access to the GoFreight databases, and GoFreight computers.

6.4.5.2 Data Administration Staff

The IT staff responsible for the data admin support for GoFreight shall receive a training course that includes the following topics:

- Structure, interfaces, and functions of the GoFreight software and databases
- Configuration and maintenance of the GoFreight databases
- Distributing map updates, if applicable.
- Maintaining and tuning the databases using database management tools
- Maintaining interfaces with existing external systems
- Management of data archives
- Generating, deleting, modifying, and installing new reports including the use of ad hoc queries
- Description of APIs and linkages to the 3rd party data user application software
- Creating new messages, audio files, pull down items, modifying displays for the website, the app, and the IVR subsystem

The course also shall include an overview of the structure, organization, and functionality of the GoFreight software, application software, and database—providing the necessary understanding to allow the data administrator to provide effective maintenance of the GoFreight system software. The informal training shall be completed before the deployment of GoFreight. The formal training shall use the final GoFreight software version and associated documentation.

Computer software maintenance training shall be given to AGENCY staff. The training shall achieve the following:

- Provide an overview of software organization
- Define external interfacing data formats, semantics, and protocols
- Define internal modules, data interfaces, tasking, considerations for timing, priorities, and resource use
- Identify and detail use of programming and database maintenance tools used to create the GoFreight software, website, app, and IVR
- Detail the procedures for reinstalling and managing software configuration
- Identify the error conditions detected within the software, and the messages or indications for those conditions
- Identify parameters used to adjust GoFreight software operation
- Detail procedures to diagnose GoFreight software functional or performance problems
- Detail procedures to identify expansion and upgrade needs
- Detail procedures to install and test new software

The materials and facilities needed include Data Administration manuals, workbooks, and access to GoFreight databases and workstations.

6.4.5.3 3rd Party Data Users

3rd Party data users and trainers shall have a segment of primarily classroom instruction, which includes the following:

- GoFreight overview
- GoFreight Dissemination Subsystem overview
- Description of the types of data available from the Dissemination Subsystem
- Procedures for accessing the data from the Dissemination Subsystem, including APIs.
- Requirements or restrictions on the use of data provided by the Dissemination Subsystem.

The Contractor shall also develop a Trainer's Guide for this course so Agency can provide future training for additional 3rd party users. The Trainer's Guide shall be designed for use by experienced trainers, rather than subject matter experts in the course topic. The Trainer's Guide shall show trainer and trainee material side-by-side, with the trainer portion containing time needed for each step and clearly described details of how to do the following:

- Present material
- Lead group work
- Run exercises and activities
- Operate special equipment

The Trainer's Guides shall contain supporting material beyond the material for trainees, including the following:

- An explanation of the instructional and sequencing strategies
- Identification of steps trainees typically have difficulties with, how to recognize those difficulties, and what to do to help
- Suggested questions and answers for discussions
- Evaluation steps that demonstrate knowledge, comprehension, and application
- Appropriate media for each step
- Complete reproducible materials and instructions as appropriate
- Containing checklist of materials and tools

The Contractor shall provide the trainee and Trainer's Guide materials in electronic softcopy, in a widely used format. The Contractor shall grant AGENCY all rights to reproduce or modify training materials for its own use as set forth in the Agreement.

6.4.5.4 IVR Attendant Staff

IVR attendants and trainers shall have a segment of primarily classroom instruction, which includes the following:

- GoFreight overview
- GoFreight IVR detailed description of functions and menu options.
- Description of the types of data available on the IVR subsystem

- Procedures for assisting users with the function of the IVR subsystem
- Procedures for maneuvering users within the IVR subsystem
- Discussion regarding the accuracy of data provided by the IVR subsystem

The Contractor shall also develop a Trainer's Guide for this course so Agency can provide future training for additional IVR attendants. The Trainer's Guide shall be designed for use by experienced trainers, rather than subject matter experts in the course topic. The Trainer's Guide shall show trainer and trainee material side-by-side, with the trainer portion containing time needed for each step and clearly described details of how to do the following:

- Present material
- Lead group work
- Run exercises and activities
- Operate special equipment

The Trainer's Guides shall contain supporting material beyond the material for trainees, including the following:

- An explanation of the instructional and sequencing strategies
- Identification of steps trainees typically have difficulties with, how to recognize those difficulties, and what to do to help
- Suggested questions and answers for discussions
- Evaluation steps that demonstrate knowledge, comprehension, and application
- Appropriate media for each step
- Complete reproducible materials and instructions as appropriate
- Containing checklist of materials and tools

The Contractor shall provide the trainee and Trainer's Guide materials in electronic softcopy, in a widely used format. The Contractor shall grant AGENCY all rights to reproduce or modify training materials for its own use as set forth in the Agreement.

7 DEVELOPMENT PLAN

7.1 PROJECT MANAGEMENT REQUIREMENTS

The following Project Management elements shall be incorporated as a key component of the project to implement GoFreight.

7.1.1 Project Management Personnel

The scope, duration and size of this project require the Contractor to create an effective Project Management team to ensure the success of the work. All key project team members shall remain on the project until completion of the project. The project team shall include at least one individual for each of the following positions:

- Software Architect
- System Analyst
- Designer
- Copy writer
- Front-end Developer
- Back-end Developer
- Mobile Developers (for iOS and Android)
- System Administrator / Hosting Engineer
- Test Engineer

7.1.1.1 Project Manager

The Contractor shall assign a Project Manager, who shall be highly responsive to the needs of the GoFreight project as required in these Requirements and subject to AGENCY acceptance. The Project Manager shall coordinate design and engineering activities and provide a technical liaison to AGENCY. This person shall be highly competent and fully qualified in all aspects of the GoFreight project.

The Project Manager shall be identified to AGENCY in the proposal.

7.1.1.1.1 Authority

The Project Manager shall have the contracting authority to issue and approve purchase orders and to bind the Contractor contractually. The Project Manager shall have the authority to assign and schedule Contractor personnel to perform all of the Work required by this Requirements, and act as Contractor's representative for dispute resolution.

7.1.1.1.2 Responsibility

The Project Manager shall provide a single point of contact for AGENCY to resolve all issues related to the GoFreight project. The Project Manager shall be responsible for directing all

subcontractors' designs and work. The Project Manager shall conduct weekly project status meetings with AGENCY staff and provide monthly updates for the AGENCY.

7.1.1.1.3 Project Understanding

The Project Manager shall have a full and complete understanding of the Requirements and the Agency and stakeholder needs to provide adequate direction for coordination of work.

7.1.1.1.4 Qualifications

The Project Manager shall have at least five years experience in the implementation and management of website, app, and IVR projects. AGENCY shall be the sole determinant of the suitability of the proposed Project Manager's qualifications. AGENCY reserves the right to have the Project Manager replaced if these qualifications are not met.

7.1.1.1.5 Availability to the Project

The Project Manager shall be available to AGENCY on a twenty-four hour per day, seven days per week basis via telephone and pager and shall respond promptly to any reasonable AGENCY request. Coverage of this requirement by any alternates shall be subject to approval by AGENCY.

The Project Manager shall be on site during all significant project events, as necessary to facilitate meetings, project activities, and information flow between the Contractor and AGENCY, and as requested by AGENCY.

7.1.1.2 Software Architect

The Software Architect shall be identified in the proposal and shall be available to the Project within seven days after NTP.

7.1.1.2.1 Responsibility

The Software Architect shall act as a technical resource for coordinating all system design and implementation issues. The Software Architect shall check each technical submittal prior to its being sent to AGENCY for approval. The Software Architect shall check any installations and fieldwork to assure quality.

7.1.1.2.2 Project Understanding

The Software Architect shall have a complete understanding of the technical requirements of the Requirements and site conditions sufficiently to provide design direction and to determine compliance of the Contractor's design submittals and work.

7.1.1.2.3 Qualifications

The Software Architect shall be experienced in website, app, and IVR development. The Software Architect will have a minimum of five years of experience in coordinating

engineering and administrative support activities for web based data integration and dissemination projects. AGENCY shall be the sole determinant of the suitability of the proposed Software Architect's qualifications. AGENCY reserves the right to have the Software Architect replaced if these qualifications are not met.

7.1.1.3 Availability to the Project

The Software Architect shall be on site during all significant project events, as necessary to facilitate meetings, project activities, and information flow between the Contractor and AGENCY, and as requested by AGENCY.

Coverage of this requirement by any alternates shall be subject to approval by AGENCY.

7.1.2 Project Meetings

7.1.2.1 Attendance

The Contractor's Project Manager and Software Architect shall attend Progress Meetings held monthly and conduct weekly teleconference calls. The Contractor's Project Manager and Software Architect shall conduct a Project Kickoff Meeting with the AGENCY and its representatives, GoFreight stakeholders, ITS Steering Committee. The Contractor's Project Manager and Software Architect shall attend additional meetings, as requested by AGENCY and its designated representatives pursuant to the coordination of the Work.

7.1.2.2 Location

Progress meetings shall be held at AGENCY facilities unless otherwise specifically approved by AGENCY. Other meetings shall be held at a mutually agreeable location, conducive to the topic of the meeting. For any project meetings conducted by conference call, the Contractor shall, at the Contractor's expense, provide a conference call-in number.

7.1.2.3 Meeting Minutes

The Contractor shall prepare minutes for each meeting, unless specifically instructed otherwise by AGENCY <CDRL>. The Contractor shall prepare the minutes and distribute them to the attendees within one week after the meeting. Minutes of the meetings shall include names of attendees, significant proceedings, decisions, unresolved issues, and a list of information requested by AGENCY. The minutes shall be of sufficient detail to record any decisions made at the meeting and any follow-up actions required. The minutes shall include a summary of open action items, the party responsible for each, scheduled date for the action, and the respective resolution. The Contractor shall provide a rolling project report, adding and deleting items as necessary.

7.1.2.4 Agenda

The Contractor shall prepare an agenda for each progress meeting <CDRL>. The Contractor shall provide a draft agenda to AGENCY at least one week prior to each meeting and request that AGENCY add any additional items. Review of the previous meeting minutes and any

outstanding action items shall be included on the agenda for each meeting. Each progress meeting agenda shall also include the item, "Additional AGENCY Issues and Concerns."

7.1.3 Schedule

7.1.3.1 Detailed Contract Schedule

The detailed contract schedule shall be a critical-path-method schedule constructed using Microsoft Project or other software application acceptable to AGENCY. The detailed contract schedule shall show each activity, including interface activities, for completion of the Work, and shall be properly ordered and sequenced. If a phased approach is recommended by the Contractor, the Contractor shall cite an example where the recommended phased approach was successful. Three printed copies and one electronic copy of the detailed contract schedule shall be submitted for AGENCY approval within 45 calendar days after NTP <CDRL>.

7.1.3.1.1 Task Duration Limits

The detailed contract schedule shall be sufficiently detailed to preclude the use of activity durations greater than 20 working days. Activity durations shall include allowances for lost time and inefficiencies.

7.1.3.1.2 Task Designations

Each task designation shall delineate the phase or stage of the Work, and the component of the Work such as design, submittal, submittal review, procurement, delivery, installation, and testing.

7.1.3.1.3 Task Details

Where appropriate to the understanding of the task, additional details shall be provided, such as the following:

- A clear description of the activity, including its location
- The duration expressed in full working days
- A responsibility code denoting the Contractor, a subcontractor, AGENCY, stakeholder, or other party is performing the activity
- The quantity of material, in units
- The integer percent complete representing the installed progress
- The actual start and finish dates where applicable
- Unless specifically agreed to in writing by AGENCY, the Contractor is responsible for all Work to complete any task

7.1.3.2 Critical Path

The detailed contract schedule shall show a clear and definable critical path(s) for the Work and each specified milestone. Requirements and events which impose limitations, as well as dates and milestones which constrain the time, shall be clearly identified. Days of float time shall be shown. Items that require AGENCY inputs and responses shall be clearly identified.

7.1.3.2.1 Updates

The detailed schedule shall be updated monthly to show actual progress and changes to projected dates. Each update shall include a narrative describing the changes made since the last update. Each update shall be provided to AGENCY within five working days from the month-end cut-off date and submitted with each invoice. Three hardcopies and one electronic copy shall be provided <CDRL>.

7.1.3.3 Four-Week Rolling Schedules

The four-week rolling schedule shall show one week of historical information and three weeks of planned activities in support that are consistent with the detailed contract schedule.

7.1.3.3.1 Format

The four-week rolling schedule shall be presented as a chart with tasks along the left side and days along the top of the table. A shaded bar or "X" entered in the chart shall indicate the work to be performed on each day for that task.

7.1.3.3.2 Task Detail

The level of detail shown on the four-week rolling schedule shall be greater than the level shown on the detailed contract schedule. In general, it shall show the Work to be done each day and the location(s) where the work will be done and by whom. Work that requires an AGENCY input or response shall be clearly identified.

7.1.3.3.3 Updates

The four-week rolling schedule shall be updated weekly and provided to AGENCY by the end of the first day of each active week. Three printed copies and one electronic copy shall be provided <CDRL>.

7.1.4 Submittals

7.1.4.1 General

This Section describes general requirements and procedures for preparing and transmitting information to AGENCY for review, acceptance or approval. Detailed requirements for individual submittals are specified in the applicable sections of the Requirements.

7.1.4.1.1 Scheduling of Submittals

The Contractor shall transmit submittals sufficiently in advance to permit at least twenty-one (21) calendar days for the AGENCY or designated representative to review, and provide an appropriate response.

7.1.4.1.2 Transmittal Forms

The Contractor shall furnish the transmittal forms sequentially numbered and clearly indicate the Project Name; Project Number; Date; "To:"; "From:"; names of subcontractors, suppliers or manufacturers; required Requirements references; category and type of submittal; purpose; description; distribution record (for transmittals and submittals); and signature of transmitter.

7.1.4.1.3 Checking of Submittals

The Contractor shall examine and check the submittal for accuracy, completeness, and compliance with the Requirements before delivery to AGENCY. The Contractor shall sign each submittal and certify that it conforms to the requirements of the Requirements in all respects, except as otherwise indicated. By reviewing, approving, and submitting a submittal, the Contractor has determined and verified materials, data, and data interface criteria related thereto, and has checked and coordinated the information contained within such submittals with the Requirements.

7.1.4.1.4 Record of Submittals

Maintain at the worksite, or other AGENCY approved designated site, a complete up-to-date, organized file of all past and current submittals including an index and locating system, which identifies the status of each submission.

- Assign sequential numbers to each submittal.
- Assign revisions levels (A, B, C, etc.) to all resubmittals. Assign new transmittal numbers and cross references to previous submittals.

7.1.4.1.5 Electronic Format

All submittals shall be provided in electronic format as well as hardcopy. File formats for electronic copies shall be subject to AGENCY approval. Current version, industry-prevalent software shall be utilized for preparing all submittals. Drawings shall be submitted in DWG 2007 format for AutoCAD 2007. Drawings or studies involving geographic information shall be submitted in a format that can be viewed by ESRI ArcView software. The Contractor shall furnish to AGENCY three fully licensed copies of all software necessary for viewing and marking up the submittals version, industry-prevalent software shall be utilized for preparing all submittals.

7.1.4.2 AGENCY Review

AGENCY and/or designated representative will review and approve or take other appropriate action upon the Contractor's submittals. AGENCY's action will be taken as to cause no delay in the Work or in the activities of the Contractor. Review of such submittals is not conducted for determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract. AGENCY’s or designated representative's review will not constitute approval of safety precautions or, unless specifically stated by AGENCY or designated representative of any

construction means, methods, techniques, sequences, or procedures. AGENCY's or designated representative's approval of a specific item does not indicate approval of an entire assembly of which the item is a component.

7.1.4.2.1 AGENCY Acknowledgement and Disposition

All Contractor's submittals will be acknowledged by AGENCY or designated representative with (a) the date of receipt, and (b) one of the following dispositions (will be sent to the Contractor. (Transmit submittals will not be returned).

1. APPROVED: Work may proceed, provided it complies with the Requirements. The approval of documents, shop drawings and samples shall not be construed as;

- Permitting any departure from the Requirements;
- Relieving the Contractor of responsibility for errors and omissions, including details, dimensions, and quantity of materials; or
- Approving departures from details furnished by the Contracting Officer or designated representative.

2. APPROVED AS NOTED (Correct and resubmit): Work may proceed, provided:

- It complies with the Requirements as well as the corrections on the submittals, and the Contractor resubmits within fifteen (15) days corrected copies of the shop drawings, working drawings, or miscellaneous submittals for final approval; and
- Work performed by the Contractor prior to receiving final approval will be at the Contractor's risk.

DISAPPROVED (Revise and Resubmit): Work is not recognized as being able to proceed. Revise submittal in accordance with notations thereon, and resubmit immediately. The Contractor shall handle re-submittals in the same manner as first submittals, except designated with suffix A, B, C, etc. to indicate first, second, or third resubmittals. On resubmittals, direct specific attention in writing on resubmitted documents, shop drawings, working drawings, samples, mock-ups, sample panels, or miscellaneous submittals to revisions other than the corrections required on previous submissions. Make corrections as required by AGENCY or designated representative.

7.1.4.2.2 Actions Following Review

APPROVED documents and drawings will be identified as having received such approval with a dated acknowledgement. DISAPPROVED documents and drawings will be returned to the Contractor with a dated acknowledgement and directions for correction and re-submittal.

7.1.4.3 Drawings

7.1.4.3.1 Quality of Drawings

The Contractor shall be responsible for accuracy and correctness of all drawings. The Contractor's Project Manager and Software Architect shall initial each drawing after checking it, indicating that it complies with all sections of the Requirements and accurately reflects intended or actual field conditions. Drawings that require a Professional Engineer's seal per California State Law shall be sealed and signed by the Contractor's Professional Engineer before submittal.

The Contractor shall check each drawing for the following:

- Conformance with Requirements
- Logical grouping and arrangement
- Accuracy
- Legibility
- Neatness
- Line Quality
- Lettering Quality
- Reproduction Quality
- Completeness

7.1.4.3.2 Content of Drawings

The Contractor shall prepare such design, working and shop drawings as are necessary to perform the Work adequately. Each drawing shall be laid out in an organized manner such that it is easily understandable. The use of crossed lines in schematic or functional drawings shall be avoided, to the extent possible. Breaks and continuations in drawings shall be minimized. Mounting and installation drawings shall be accurately scaled and the scale shall be clearly noted on the drawing. All symbols and abbreviations used shall be defined on each drawing, or if submitted as a book of drawings, on a master symbol sheet.

7.1.4.4 Product Data Submittals

7.1.4.4.1 Quality of Submittals

A submittal shall be prepared for each major piece of software or hardware or equipment that the Contractor intends to furnish. These submittals shall be known as "Product Submittals". Four copies of each product submittal shall be furnished. Each submittal shall be accompanied by a cover letter with reference number, signed by the Project Manager. Each submittal shall contain a list of any parameters for which the submitted products do not meet the Requirements and a description of how these changes will affect system design. Each submittal shall contain a description of any changes in design or products that the submitted products will cause.

7.1.4.4.2 Content

Each submittal shall contain sufficient information to determine that the system component complies with the Requirements. Actual values of all specified parameters shall be listed; a simple statement that the product complies will not be sufficient. Each product submittal shall be accompanied by engineering drawings necessary to determine the product's applicability to the GoFreight design. All closely related products shall be submitted as a single package. When pre-printed material is used in a submittal, the specific model number and options to be furnished shall be clearly identified. Standard data sheets can be used, subject to the following:

- Manufacturer's standard and/or schematic drawings are modified to delete information, which is not applicable to the GoFreight project. The Contractor shall supplement standard information with additional information applicable to this Project.
- Manufacturer's standards, diagrams, schedules, performance charts, illustrations, calculations, and other descriptive data are modified to delete information, which is not applicable to the GoFreight project. The Contractor shall indicate dimensions, clearances, performance characteristics, capacities, and any other diagrams, as applicable.
- Installation, erection, application, and placing instructions shall be modified to delete information, which is not applicable to the GoFreight project.

7.1.4.5 Test Procedures

The Contractor shall submit three copies of each test procedure description <CDRL> for approval by AGENCY, accompanied by a cover letter with reference number.

7.1.4.5.1 Submittal Organization

Each test procedure description shall include the following information:

- A statement of the purpose of the tests
- The location, date(s) and time(s) tests will be performed
- Staff required to perform the test
- If applicable, the quantity of units to be tested
- The test equipment to be used, identified by manufacturer and model number
- A step by step description of the procedure to be performed
- Specific pass/fail criteria for each test
- A sample of the form(s) to be used to record test data

Each test form shall include the following information:

- Test title
- The manufacturer, model number and calibration date of each piece of test equipment
- A table to record individual readings taken and inspections performed for each unit tested, identified by the serial number of the unit tested
- An indication that the unit has passed or failed each individual test
- A line for signature of the technician performing the test and date
- A line for signature of the Project Manager and date

- A line for signature of AGENCY representative witnessing the test
- Drawings illustrating the configuration of the software and/or equipment tested and all test equipment utilized

7.1.4.6 Test Results

7.1.4.6.1 Content

One original, two copies, and electronic copy of the test results shall be submitted <CDRL>. The original of the test results shall contain the original test forms filled out by the test technicians performing the tests and original signatures. The test forms shall be filled out in ink and no erasures shall be made. Errors shall be crossed out with a single line and initialed by the person making the correction. Each set of test results shall be accompanied by a cover letter with reference number.

7.1.4.6.2 Organization

Each set of test results shall include the following information:

- The complete test procedures used
- The completed, signed test forms
- If applicable, summary of the test indicating quantity tested, quantity that failed, quantities that failed each individual procedure, and a statement of the remedy to be applied for failed units

7.1.5 Outreach and Marketing

7.1.5.1 General

The Contractor shall be responsible for developing an Outreach and Marketing Plan <CDRL> to facilitate the use of GoFreight data by third party developers and freight users. The Contractor shall submit the Outreach and Marketing Plan for approval by AGENCY.

7.1.5.2 Attendance

The Contractor's Project Manager and Software Architect shall coordinate and attend Outreach and Marketing Meetings held monthly. The Contractor's Project Manager shall conduct an Outreach and Marketing Kickoff Meeting with the AGENCY and its representatives, GoFreight stakeholders, ITS Working Group, select third party developers, and select users. The Contractor's Project Manager and Software Architect shall coordinate and conduct meetings with third party developers to facilitate utilization of the GoFreight API and other data interfaces. The Contractor's Project Manager and Software Architect shall coordinate and conduct meetings with freight users to facilitate utilization of the data and design of the GoFreight Website, GoFreight App, and GoFreight IVR. The Contractor's Project Manager and Software Architect shall attend additional meetings, as requested by AGENCY, third party developers, and freight users pursuant to the coordination of the Work.

7.1.5.3 Location

Progress meetings shall be held at AGENCY facilities unless otherwise specifically approved by AGENCY. Other meetings shall be held at a mutually agreeable location, conducive to the topic of the meeting. For any project meetings conducted by conference call, the Contractor shall, at the Contractor's expense, provide a conference call-in number.

7.1.5.4 Meeting Minutes

The Contractor shall prepare minutes for each meeting, unless specifically instructed otherwise by AGENCY <CDRL>. The Contractor shall prepare the minutes and distribute them to the attendees within one week after the meeting. Minutes of the meetings shall include names of attendees, significant proceedings, decisions, unresolved issues, and a list of information requested by AGENCY. The minutes shall be of sufficient detail to record any decisions made at the meeting and any follow-up actions required. The minutes shall include a summary of open action items, the party responsible for each, scheduled date for the action, and the respective resolution. Contractor shall provide a rolling project report, adding and deleting items as necessary.

7.1.5.5 Agenda

The Contractor shall prepare an agenda for each progress meeting <CDRL>. The Contractor shall provide a draft agenda to AGENCY at least one week prior to each meeting and request that AGENCY add any additional items. Review of the previous meeting minutes and any outstanding action items shall be included on the agenda for each meeting. Each progress meeting agenda shall also include the item, "Additional AGENCY Issues and Concerns."

7.1.6 As-Built Documentation

As-built documentation shall include drawings and software documentation. As-built documentation shall include the following:

- Design and Installation of the GoFreight Website, GoFreight App, and GoFreight IVR
- Design and Installation Plans of the GoFreight Data Integration Engine
- Design and Installation Plans of the GoFreight Data Dissemination subsystem
- Design and Installation Plans of the GoFreight LAN/WAN, if applicable

7.1.6.1 As-Built Drawings

7.1.6.1.1 Drawings Content

As-built drawings shall provide a permanent record of the finished system. Each design, working and shop drawing that was submitted for approval shall be modified to reflect the actual installed condition and shall become an as-built drawing. These drawings shall be supplemented with site-specific information. If a drawing is typical for more than one location, the locations shall be explicitly listed on the drawing. Content of the drawings shall be conveyed as follows:

- All nomenclature and labels shall correspond to the actual labels on the installed Equipment.
- Each connection to each piece of equipment, junction box, or terminal block shall be identified by function and color code.
- All dimensions, physical details, connections, and other information pertinent to system diagnostics, maintenance or troubleshooting shall be shown.

7.1.6.1.2 Organization of Drawings

All drawings germane to a subject shall be submitted as a package with a cover sheet, index, and symbols and abbreviations table. A master index of as-built drawings that organizes the drawings by package and drawing number shall be provided.

7.1.6.1.3 Submittal of Drawings

A pre-final version of the as-built drawings shall be submitted to AGENCY prior to training and prior to acceptance testing <CDRL>. The Contractor shall correct any inaccuracies and add plans to correct any deficiencies as identified by AGENCY or as necessary to document changes made during acceptance testing. Final versions of the as-built drawings shall be submitted within two weeks after acceptance testing or training, whichever is later <CDRL>.

7.1.6.1.4 Products

Two copies of pre-final drawing packages shall be submitted in 11”x17” hardcopy format and two copies on CD-ROM in AutoCAD 2007 or later format. Three copies of final as-built drawings shall be submitted in 11”x17” hardcopy format and two copies on CD-ROM in AutoCAD 2007 or later format.

7.1.6.2 As Built Software Documentation

The Contractor shall provide all necessary software and data to allow AGENCY to fully maintain and update all applications software, computers, and data shall include as-built versions of the following <CDRL>:

- Software Requirements Specification;
- Software Version Description Document, or equivalent;
- All "batch" or equivalent files, and all object libraries and "include" files, for editing, compiling, linking, and installing application software. Corresponding instructions shall also be provided;
- All files required to define, allocate, and load the database, and any other data files required to define, configure, load, or operate the system. Corresponding instructions shall also be provided.
- A list of the configuration parameters and their values. A list of potential problems if the configuration parameters are set to extreme values.

Two copies of each document shall be submitted in electronic form (Diskette, CD-ROM, or other media and in a format that is accessible by AGENCY) in order for it to be incorporated into AGENCY's electronic document library.

The Contractor shall be required to provide source code and sufficient documentation including source code documentation in Escrow to permit modification of the delivered software without the necessity of contacting the Contractor in the event the Contractor is unwilling or unable to undertake such modifications. Proposers shall explain, in detail, the documentation to be supplied, provide samples, and guarantee of content with proposals. Source code and source code documentation for COTS software shall not be required.

7.1.7 Document Management System

Due to the substantial amount of documentation involved in this project, Contractor shall work with AGENCY's Project Manager to develop and submit to AGENCY a Documentation Management System <CDRL>. The Document Management System shall include an organized electronic library of all versions of all submittals and a log of the contents. This shall be completed within 30 days after Notice to Proceed.

AGENCY and the Contractor shall mutually agree on a documentation file index that shall provide an overall methodology for referencing documents generated in the course of the project. File type and organization of electronic versions of documentation shall be mutually agreed on by AGENCY and Contractor. All subsequent documentation shall be referenced to the file index, and Contractor and AGENCY shall mutually maintain the file index in current condition to show all documents that have been generated and their status.

Documentation in the DMS shall be readily available to AGENCY's Project Manager, designated personnel within the Contractor's organization, and additional AGENCY designated personnel. Security methods shall be available to restrict access by others.

7.1.8 Quality Assurance

The Contractor shall submit to AGENCY within 60 days of the Notice-To-Proceed (NTP) a comprehensive Quality Assurance (QA) Program Plan designed to ensure the quality of all activities, including design, purchasing, inspection, handling, assembly, testing, storage, shipping, and warranty/repair work <CDRL>. The plan shall describe all quality control procedures of the Contractor and any sub-suppliers. The Contractor shall conduct regular inspections in accordance with guidelines defined by the QA Program Plan. Performance of any design or construction work shall not commence until the Quality Assurance and Control Plan relating to such Work has been accepted by AGENCY. The Contractor shall update the QA Program Plan as necessary, when any deficiencies in the Work are discovered.

AGENCY will, at its own discretion, perform QA monitoring of work done under this Contract, including monitoring of the Contractor's or Subcontractor's QA activities. Upon request, the Contractor's QA records shall be made available to AGENCY for inspection. Such QA activities performed (or not performed) by AGENCY shall not reduce nor alter the Contractor's QA responsibilities or its obligation to meet the requirements of this document.

7.1.9 Project Closeout

Project closeout shall include an initial survey and a final survey.

7.1.9.1 Initial Survey

7.1.9.1.1 Pre-Requisites

Prior to requesting an initial closeout survey of the GoFreight project, the Contractor shall ensure the following conditions shall have been met <CDRL>:

- The systems acceptance test has been conducted.
- The Contractor has listed those items yet to be completed or corrected and has submitted a detailed plan of action and schedule for completion of the outstanding items.
- The Contractor has submitted special guarantees, warranties, maintenance agreements, final certifications and similar documents.
- The Contractor has obtained and submitted operating certificates, if required, final inspection and test certificates, and similar releases enabling full and unrestricted use of the Work.
- The Contractor has submitted operations and maintenance manuals and final as-built documentation.
- The Contractor has delivered software and hardware tools, including special tools, test equipment and software, standby equipment, and similar items.

7.1.9.1.2 Conducting the Survey

Upon receipt of the request for initial survey, AGENCY will prepare a list of any additional work items that are outstanding. AGENCY will schedule a time for AGENCY and the Contractor to inspect the Work and prepare a list of exceptions, if any.

7.1.9.2 Final Survey

7.1.9.2.1 Pre-Requisites

The Contractor shall perform the Work necessary to complete and correct the items noted during the initial survey. The Contractor shall provide written notice to AGENCY that the items have been completed <CDRL> and GoFreight is ready for a final survey.

7.1.9.2.2 Conducting the Survey

Upon receipt of the notice, AGENCY will schedule a final survey to verify that all of the Work items have been completed satisfactorily.

7.1.10 System Deliverables

GoFreight deliverables provided by the Contractor shall include all Work required to deliver GoFreight in accordance with this Requirements. This list is for convenience of the proposers only and shall not be considered all-inclusive. All hardware delivered shall have a full life span when delivered to AGENCY. All hardware and software shall be the newest version available at the time of installation at AGENCY.

7.1.10.1 GoFreight Hardware

The Contractor shall provide all hardware and software necessary for GoFreight including servers, and WAN/LAN equipment as required. The GoFreight computers (servers and LAN) shall be delivered and installed in the AGENCY facility or another facility designated by AGENCY. The installation shall be accomplished per the Contractor-provided and AGENCY -approved schedule. Installation and deployment of GoFreight shall not disrupt Go511 or RIITS operations.

7.1.10.2 GoFreight Software and Databases

The Contractor shall deliver and deploy all software and databases used for GoFreight. The deployment of the GoFreight software and databases shall be accomplished per the Contractor-provided and AGENCY approved schedule. Deployment and testing of software and databases shall not disrupt AGENCY operations.

7.1.10.3 Manuals, Training, and Training Tools

The Contractor shall provide manuals, training, and training tools including simulators and training/testing units for the proper operation, maintenance, and repair of GoFreight. Delivery of the manuals, training, and training tools shall be accomplished per the Contractor-provided and AGENCY -approved schedule.

7.1.10.4 Design Submittals

The Contractor shall provide preliminary and final design submittal packages, as well as individual design details for all elements specified herein. The Contractor shall provide detailed cutover plans and procedures. All submittals shall be in both hardcopy and electronic format.

7.1.10.5 As Built Documentation

The Contractor shall provide As Built Documentation as described in Section 7.1.6.2. Delivery of the As Built Documentation shall be accomplished per the Contractor-provided and AGENCY-approved schedule. All as-built documentation shall be provided in both hardcopy and in electronic format.

7.1.10.6 Monthly Status Reports

Monthly status reports shall be submitted to AGENCY on the 10th of each month detailing the previous month's progress <CDRL>. The monthly status report shall contain a description of

the activities and accomplishments, an updated schedule showing the progress, and any issues or concerns. Contractor format is acceptable.

7.1.10.7 Test Plans/Procedures and Test Results

The Contractor shall provide all Test Plans/Procedures required for the GoFreight project and the Test Results. The Test Plans/Procedures and Test Results format shall be submitted to AGENCY for approval.

7.1.10.8 Closeout Documentation

The Contractor shall provide closeout documentation as described in Section 7.1.7.

7.1.11 System Support

7.1.11.1 Prior to System Acceptance

The Contractor shall provide support for the maintenance and operation of installed GoFreight subsystems after incremental acceptance and prior to System Acceptance. AGENCY's may begin operating GoFreight after completion of the first incremental acceptance. Between the first incremental acceptance and the System acceptance, the Contractor shall provide support to AGENCY to repair GoFreight software and hardware and assist with data management.

The Contractor shall provide support on a continuous basis on-site at AGENCY or AGENCY designated facility or server environment during the testing, initial deployment and subsequent cutover of GoFreight software and hardware. The Contractor shall provide support for GoFreight software and hardware twenty-four hours per day, seven days per week. All requests by AGENCY for assistance shall be answered within thirty minutes of a page or message from AGENCY. On-site support shall be provided within two hours at the AGENCY facility.

7.1.11.2 Post System Acceptance

The Contractor shall provide on-call and on-site support during the warranty period as defined in the Warranty provision of the Contract.

7.2 ACCEPTANCE TESTING

The Contractor shall test each component of software and hardware provided under this Contract to assure that it is compliant with the Requirements, approved design concepts, and is free of functional, manufacturing, and/or material defects. For each test, the Contractor shall submit to AGENCY evidence in the form of test reports that the equipment has been tested to function in the stated operational environment and under the stated loading conditions. This section describes the formal testing requirements. The Contractor shall perform additional tests and pre-tests so that these formal tests can be executed efficiently and effectively, with minimal failures.

The tests shall be conducted in a multi-tiered program intended to identify and correct any deficiencies as early in the program as practical, so that overall impacts to the program development are minimized. In no case shall equipment or software proceed to the next level of testing or integration without having passed the necessary formal pre-requisite tests.

- A data interface and conversion demonstration shall be held within six months after a notice-to-proceed is issued to the Contractor. This demonstration shall identify the Contractor's progress in developing the data handling subsystems and shall assist in acclimating AGENCY personnel to GoFreight. The data handling subsystem tests shall include at minimum:
    - Data Input Interface Test - This test shall demonstrate and verify that the data integration engine is accepting inputs from data sources in a timely manner.
    - Data Conversion Test - This test shall demonstrate and verify that all internal algorithms for processing data from data sources are achieving the correct output.
    - Data Output Interface Test - This test shall demonstrate and verify that the data dissemination engine is providing accurate data to external sources in a timely manner.
- The subsystems shall be tested at the Contractor's facility or testing environment prior to delivery to AGENCY or deployment to a live environment. These facility tests shall fully exercise functionalities of the subsystems in order to prove out design and interface characteristics. Testing at the Contractor's facility or test environment shall be intended to simulate the installed environment as closely as practical.
- Preliminary Functional Testing (PFT) shall be conducted, with all components installed in order to demonstrate substantial progress and to identify and document the installed GoFreight physical configuration. Field testing shall prove out the system functionality prior to introduction to general service. PFT tests shall include at minimum:
    - Website Test - This test shall demonstrate and verify that the GoFreight website is functional on all supported platforms, and meets all functional requirements
    - App Test - This test shall demonstrate and verify that the GoFreight app is functional on all supported platforms, meets all functional requirements. The test shall additionally demonstrate that the app accurately mirrors the data being displayed on the website.
    - IVR Test - This test shall demonstrate and verify that the GoFreight IVR subsystem meets all functional. The test shall additionally demonstrate that the IVR data accurately mirrors the data being displayed on the website.
- The following Load Tests shall be conducted after the functional tests are complete:
    - Website load test – This test shall demonstrate that the GoFreight Website can function correctly as designed under the required maximum load levels. A third party load testing tool or service may be employed if approved by the Agency. The Contractor shall be responsible for the cost of any third party load testing tool or service.
    - Mobile App load test – This test shall demonstrate that the GoFreight App can function correctly as designed under the required maximum load level. A third party load testing tool or service may be employed if approved by the Agency.

The Contractor shall be responsible for the cost of any third party load testing tool or service.

  - IVR load test – This test shall demonstrate that the GoFreight IVR subsystem can function correctly as designed under the required maximum load level. A third party IVR load testing tool or service may be employed if approved by the Agency. The Contractor shall be responsible for the cost of any third party IVR load testing tool or service.

- Following this, GoFreight shall be deployed and made available to selected beta users and developers as a trial deployment of the final system. The beta-testing shall be closely coordinated through the Contractor's deployment plan.
- The final acceptance tests shall be conducted to identify and correct any deficiencies found through use of GoFreight for an extended period.

All testing shall be conducted in accordance with the approved testing plans and procedures. All test results shall be documented and submitted to AGENCY in formal test reports.

Regression tests shall be conducted upon the installation of any new software or patches.

7.2.1 Testing Facilities

The Preliminary Functional Testing (PFT) tests, as described in this Section shall be performed at the AGENCY facility or server environment with the data integration and dissemination systems fully implemented and interconnected via the GoFreight and the AGENCY networks. Final versions of all required software shall be deployed.

The beta and final acceptance testing shall be performed at the AGENCY facility or server environment upon completion of the GoFreight deployment and implementation.

7.2.2 Test Administration

All tests shall be administered by the Contractor under AGENCY supervision. The Contractor shall provide maintenance of GoFreight as necessary during the tests. This maintenance shall be noted by the Contractor in a log to be sent to AGENCY. The log shall remain the property of AGENCY.

7.2.2.1 Test Equipment and Personnel

The Contractor shall furnish all test equipment and personnel. If applicable, the test equipment shall have been calibrated within one year of date of test by a method recognized in the industry. The test personnel shall be properly trained, experienced technicians who are intimately familiar with the system.

7.2.2.2 Trouble Call

A trouble call is defined as a call for repair service, except for calls due to negligence of AGENCY, abuse of hardware or software, operator error, acts of God, "no trouble found", or

other reason clearly not attributable to the hardware or software reliability. For each valid trouble call, the nature of complaint and correction/repair made shall be documented.

7.2.3 Test Results Review

All testing and interpretation of results will be the responsibility of AGENCY'S designated test administrator. AGENCY'S test administrator will review the information and data provided by the Contractor and determine whether the system components, subsystems, and/or integrated system have performed in accordance with the Requirements.

The Contractor shall provide AGENCY'S designated test administrator with a minimum of four weeks advance notice of each scheduled test and the opportunity to inspect system components and observe all testing at the Contractor's factory and the AGENCY facility.

7.2.4 Submittals

The Contractor shall submit detailed procedures for each test described herein <CDRL> for AGENCY approval.

The Contractor shall submit documentation for all test results <CDRL> for AGENCY approval, including the results for failed tests.

7.2.5 Reporting Requirements

During the acceptance test period, the data transfer functions and data accuracy and integrity shall be monitored. All failures that are not attributable to the operation of a specific GoFreight subsystem shall be recorded as network failures. The network failures shall also include the failure to produce a report and the failure to register an alarm condition. AGENCY shall be informed in writing, of any network failures within five (5) days of occurrence <CDRL> and the Contractor shall take corrective action to alleviate such failures. Any system failure or condition that is not meeting the Requirements and/or not reported by the Contractor shall result in a restart of the acceptance test period for the Article under test.

7.2.6 Subsystem Tests

Subsystem tests shall verify that the major GoFreight subsystems comply with the Requirements, prior to the delivery of GoFreight to AGENCY. Related GoFreight components may be integrated and tested together to verify compliance of the individual subsystem and its interface(s).

The interfaces between GoFreight subsystems are viewed as crucial aspects of GoFreight design. To verify these interfaces, the subsystem tests shall include as many subsystems interfaced together as possible.

7.2.6.1 Data Integration Engine

The Data Integration Engine shall be tested as a whole. A representative sample of data sources may be utilized as long as sufficient network traffic is induced to simulate the full set of data sources for loading and response time testing.

The testing shall verify the complete functionality of the Data Integration Engine, including Data Integration Engine servers, GoFreight LAN, GoFreight alarm reporting, failure modes, and report generation.

At a minimum, all functions identified in the Software Requirements Specification shall be tested, including the following:

- Tabular listing of server status and incidents
- Incident report creation and accuracy verification
- Report generation functionality and accuracy verification
- Interface with external data inputs
- Data processing algorithms
- Gate queue time calculation accuracy
- Verification of compliance with system response time requirements
- Verification of compliance with the single point of failure and availability requirements

7.2.6.2 Data Dissemination Engine

The Data Dissemination subsystem shall be factory tested as a whole. A representative sample of data users may be utilized as long as sufficient network traffic is induced to simulate the required number of data users for loading and response time testing. An interface to the AGENCY LAN/WAN shall be simulated for the purpose of verification of data transfer.

The testing shall verify the complete functionality of the Data Dissemination subsystem, including GoFreight servers, GoFreight LAN, GoFreight alarm reporting, failure modes, and report generation.

At a minimum, all functions identified in the Software Requirements Specification shall be tested, including the following:

- Tabular listing of server status and incidents
- Incident report creation and accuracy verification
- Interface with the external data users
- Verification of compliance with system response time requirements
- Verification of compliance with the single point of failure and availability requirements
- Peak activity loading shall be tested using simulated data users representing up to 150% of the expected quantity of data users

7.2.7 System Acceptance Testing

The System Acceptance testing shall demonstrate that the entire fully integrated GoFreight system complies with the Requirements. The acceptance testing shall not commence until all GoFreight components and materials of the Contract have been delivered and installed and "debugging" has been completed. All training shall have been completed prior to the initiation of the acceptance testing. Upon completion of the installations, interfacing, and implementation of all GoFreight System Components and subsystems including all interfaces and servers, a 30 day formal acceptance testing period shall commence, during which the Contractor shall conduct the following sections.

Defects found by AGENCY during the System Acceptance testing will be promptly reported to the Contractor for repair/correction at the Contractor's sole cost and expense. Each repair/correction shall be documented and the documentation shall be provided to AGENCY <CDRL>.

7.2.7.1 Integrated System Functional Test

The System Acceptance testing shall, at a minimum include the following:

- Data Dissemination throughput measurements
- Tabular listing of status and incidents
- Interface with the AGENCY LAN/WAN, and other AGENCY systems
- Interface with external data inputs
- Interface with the external data users
- Webpage, App, and IVR functionality
- Memory management measurements
- Travel time calculation accuracy
- Dynamic routing accuracy
- Verification of traffic map speed display
- Verification of map display panning and zooming capability
- Verification of turn by turn navigation
- Verification of user login, pin, and profile storage
- Verification of user following feature
- Gate queue time calculation accuracy
- CPU loading measurements
- Verification of compliance of response time requirements for webpage, app, and IVR for a worst case busy hour
- Correlation between supplied documentation and actual operation
- Accuracy of information provided on webpage, app, and IVR
- Add, modify and delete messages on webpage, app, and IVR
- Add, modify, and delete pull-down menus on webpage and app
- Interface to RIITS, Go511, and other data providers
- Data archival and retrieval

7.2.7.2 Database Validation

The GoFreight databases shall be validated. The databases shall be validated through generation of reports and analysis of all reported "abnormal conditions" to determine whether the reported "abnormal conditions" are due to a database anomaly shall be investigated:

- Reports of incorrect website predictions
- Reports of incorrect IVR responses
- Reports of incorrect App predictions
- Reports of inconsistent reporting between the website, App and IVR

Abnormal conditions shall be recorded and investigated to determine if systemic errors exist. The deficiencies shall be corrected. Documentation of abnormalities and corrections shall be furnished to AGENCY <CDRL>.

7.2.7.3 System Acceptance 30-Day Monitoring

The Contractor shall continue to provide an on-site test representative for one month from the inception of the System Acceptance Tests. The representative shall work with the AGENCY test administrator to investigate and categorize GoFreight failures and to work with AGENCY to repair GoFreight related failures, as part of the warranty, as described in the warranty agreement.

At the end of this time, the Contractor shall prepare a report assessing the system performance vs. availability and reliability requirements <CDRL> and a report noting compliance with all paragraphs of the Requirements. Corrective actions shall be suggested if GoFreight does not achieve the required reliability and availability. AGENCY will review the recommended corrections and provide guidance to the Contractor regarding the Contractor's actions to correct any deficiencies.

7.3 SUBMITTALS AND DESIGN REVIEWS

This Section also defines the requirements for the Contractor to hold formal design reviews with AGENCY. The Contractor shall submit information with the proposal for evaluation and at the preliminary and final design levels for review and approval by AGENCY.

Additional submittals are required as appropriate to the work. The submittals are described in individual sections of these Requirements as a Contract Deliverables Requirements Listing <CDRL>.

7.3.1 Preliminary Design Submittal

The Contractor shall provide a preliminary design submittal <CDRL> within ninety (90) days after Notice to Proceed. This submittal shall be reviewed in detail with AGENCY and their designated representatives to verify that all aspects of the Contractor's design are in conformance with Requirements and are fully understood by AGENCY. In the event additional elements are planned for a subsequent implementation, those elements shall also be addressed detailing the GoFreight capacity that will be necessary for the additional elements.

The Contractor shall demonstrate that additional elements could be added later without an adverse impact to the current hardware and software being implemented. The Contractor shall submit at least three printed copies and one electronic copy in a format that is accessible by AGENCY

7.3.1.1 Overview

The preliminary design submittal shall include a complete description of each GoFreight subsystem and system component, updates of the technical information submitted with the proposal, and an updated detailed project schedule. At a minimum, the overview shall describe the database type and structure, computing resources required, integration engine hosting location, dissemination subsystem capacity, IVR functionality, website and app functionality, as well as the functionality of any optional items that have been exercised. Preliminary installation drawings for the Integration Engine and Data Dissemination Subystem server location shall be presented.

7.3.1.2 Software Requirements Specification

The Contractor shall submit a draft Software Requirements Specification document based upon IEEE 830, Recommended Practice for Software Requirements Specifications Software Requirements Specification <CDRL>. It shall cover the software documentation with an emphasis on the user interfaces, and interfaces to external systems. While the complete document will be submitted, it is not the intent of AGENCY to review or approve the internal workings of the software. The Contractor shall submit the first draft of the Software Requirements Specification document within forty-five (45) days after Notice to Proceed, and a revised version to coincide with the Preliminary Design Review submittal.

7.3.1.3 Manufacturer Data Sheets

The preliminary design submittal shall include data sheets for all major hardware and off-the-shelf software components.

7.3.1.4 Integration Engine Subsystem

The preliminary design submittal shall include a complete description of the Data Integration Engine including the software, the servers, interfaces, UPS, and installation information.

7.3.1.5 Description of the Website to Be Developed

The Contractor shall provide a comparison of the functionality of the existing Go511 website with the proposer's product to the GoFreight functionality requirements, and a description of the process that will be used to develop new features to provide the specified GoFreight functionality.

7.3.1.6 Queue Time Prediction Information

A detailed description of the process and algorithm for the queue time predictions shall be provided.

7.3.1.7 Website and App Design

The preliminary design submittal shall include mockups of the screens for the website and the App. The submittal shall also include a complete description of the website and App, including a list of the pull down menus and items, site map, sample camera images, and sample queue time predictions.

7.3.1.8 IVR Design

The preliminary design submittal shall include sample audio files for the IVR and a flowchart showing how a user will obtain information. The submittal shall also include a complete description of the IVR, including a list of the menus items, sample predictions, and sample messages in Spanish.

7.3.2 Final Design Submittal

The Contractor shall provide a final design submittal <CDRL> within four months after the Notice to Proceed. The submittal shall be reviewed in detail with AGENCY and their designated representatives to verify that all aspects of the Contractor's final design are in conformance with the Requirements and are fully understood by AGENCY. The Contractor shall submit at least three printed copies of the final design submittal and one electronic copy in a format that is accessible by the AGENCY.

7.3.2.1 Overview

The final design submittal shall include a complete description of each GoFreight subsystem and system component, updates to the technical information submitted in the preliminary design submittal, and an updated detailed project schedule. At a minimum, the overview shall provide details of each subsystem and discuss any changes and updates that have been made since the preliminary design submittal to the database type and structure, computing resources required, Data Integration engine location, dissemination subsystem location, IVR functionality, website and App functionality, as well as the functionality of optional items that may have been exercised. Final installation drawings for the Data Integration engine location, Data Dissemination subsystem location, and optional items that have been exercised shall be provided along with installation plans.

7.3.2.2 Integration and Dissemination Engines Hardware and Software

The final design submittal shall contain sufficient information to determine that the GoFreight fully complies with the Requirements and that the design is complete with all interfaces defined. The actual values of all specified parameters shall be listed. Engineering drawings shall be provided as necessary. When pre-printed materials are used in a submittal, the specific

model number and options to be furnished shall be clearly identified. All interfaces with external systems shall be documented.

7.3.2.3 Interconnection Details

The drawings furnished shall show details of all interconnections, including pin assignments, color codes, terminal designations, tag nomenclature, and their functions.

7.3.2.4 Rack Layouts

The scaled drawings furnished shall show all equipment to be installed in each rack or cabinet.

7.3.2.5 Installation Details

The scaled drawings furnished shall show the arrangement of racks at the facility, routing of interconnection cables, routing of power and ground cables, and transmission line installation details. The drawings shall show keyed parts list for mounting hardware.

7.3.2.6 Software Design Document

The final design submittal shall include a complete description of the software and firmware applications being furnished, including the software version and the options selected. In addition, an updated description of the GoFreight software and complete interface ICDs to all external systems shall be provided. At a minimum, the Software Design Document shall contain descriptions of the software logic, data dictionary, and database structure.

7.3.2.7 Website Map

The final design submittal shall include a complete description of the website map being furnished, including the software version and any options selected. In addition, an updated description of the GoFreight website and complete interface ICDs to all external systems shall be provided.

7.3.2.8 IVR Menu Map

The final design submittal shall include a complete description of the IVR menus being furnished, including the software version and any options selected. In addition, an updated description of the IVR subsystem, flowcharts, and complete interface ICDs to all external systems shall be provided.

7.3.2.9 Test Procedures

A complete procedure shall be provided for the tests and inspections necessary to verify the complete functionality of the installed equipment.

7.3.3 Design Reviews

The Contractor shall conduct formal presentations of the Preliminary Design and the Final

Design submittals for GoFreight. The design review presentations shall be scheduled approximately two weeks after submission of the presentation materials to AGENCY for review. At least ten copies and one electronic copy in a format that is accessible by AGENCY shall be submitted.

Each design review shall be conducted according to the following agenda:

- The Contractor shall present the design submittal in sufficient detail to demonstrate details of achieving compliance with the Requirements. Use of mock-ups, samples, and demonstrations of the user graphical user interfaces is encouraged.
- AGENCY and its designated representatives shall present issues and concerns for discussion.

The Contractor shall furnish minutes of the design review meetings <CDRL>.

AGENCY will follow up each design review with written comments on the design deliverable. The Contractor shall address all of AGENCY's issues and concerns in writing <CDRL>. At the sole discretion of AGENCY, if the issues and concerns warrant it, AGENCY will require an additional design review presentation or design review submittal.

APPENDIX A. GLOSSARY OF ACRONYMS

API	Application Programming Interface
ATMIS	Advanced Transportation, Management, Information, and Security
ATSAC	Automated Traffic Surveillance and Control
AVL	Automatic Vehicle Location
C	Celsius
CAD	Computer Aided Dispatch
CD	Compact Disc
CDRL	Contract Deliverables Requirements Listing
COG	Council of Government
CHP	California Highway Patrol
CMS	Changeable Message Sign
DGPS	Differential Global Positioning Satellite
DMA	Dynamic Mobility Applications
DMS	Document Management System
DXF	Drawing Exchange Format
EIA	Electronic Industries Association
ESRI	Environmental System Research Institute
F	Fahrenheit
F3	Form, Fit, and Function
GoFreight	Freight Focused Traveler Information System
FHWA	Federal Highway Administration
FM	Frequency Modulation
FRATIS	Freight Advanced Traveler Information System
FTA	Federal Transportation Administration
GB	Gigabyte
GHz	Gigahertz
GIS	Geographical Information System
GPS	Global Positioning Satellite
GUI	Graphical User Interface
Hz	Hertz
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IP	Internet Protocol
ISO	International Standards Organization
ITS	Intelligent Transportation System
IVR	Interactive Voice Response
JSON	JavaScript Object Notation
KHz	Kilohertz
LADOT	Los Angeles Department of Transportation
LAMP	Linux Apache MySQL PHP
LAN	Local Area Network
LCS	Lane Closure System
MB	Megabyte

Mbps	Megabits per Second
MHz	Megahertz
MIL	Military
MPH	Miles per Hour
MTA	Los Angeles County Metropolitan Transportation Authority
NTCIP	National Transportation Communications for ITS Protocol
NTP	Notice to Proceed
OS/OW	Oversize/Overweight
OSI	Open System Interconnection
PC	Personal Computer
POLB	Port of Long Beach
POLA	Port of Los Angeles
QA	Quality Assurance
RAID	Redundant Array of Inexpensive Disks
RAM	Random Access Memory
RFP	Request For Proposal
RIITS	Regional Integration of Intelligent Transportation System
RITA	Research and Innovative Technology Administration
SNMP	Simple Network Management Protocol
TENS	Truck Enforcement Network System
TIS	Traveler Information System
TTMS	Travel Time Management Systems
USGS	United States Geodetic Survey
WAN	Wide Area Network
ZEFC	Zero Emission Freight Corridor